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ACORN USER

SEPTEMBER 1986
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32016 add-on packs punch

TYPE DESIGNER:
Stylish letters by numbers

MAZE GAME
Get out of this one if you can!

50th ISSUE:
Free software
page 7

LABORATORY WORKSTATION FOR YOUR COMPUTER

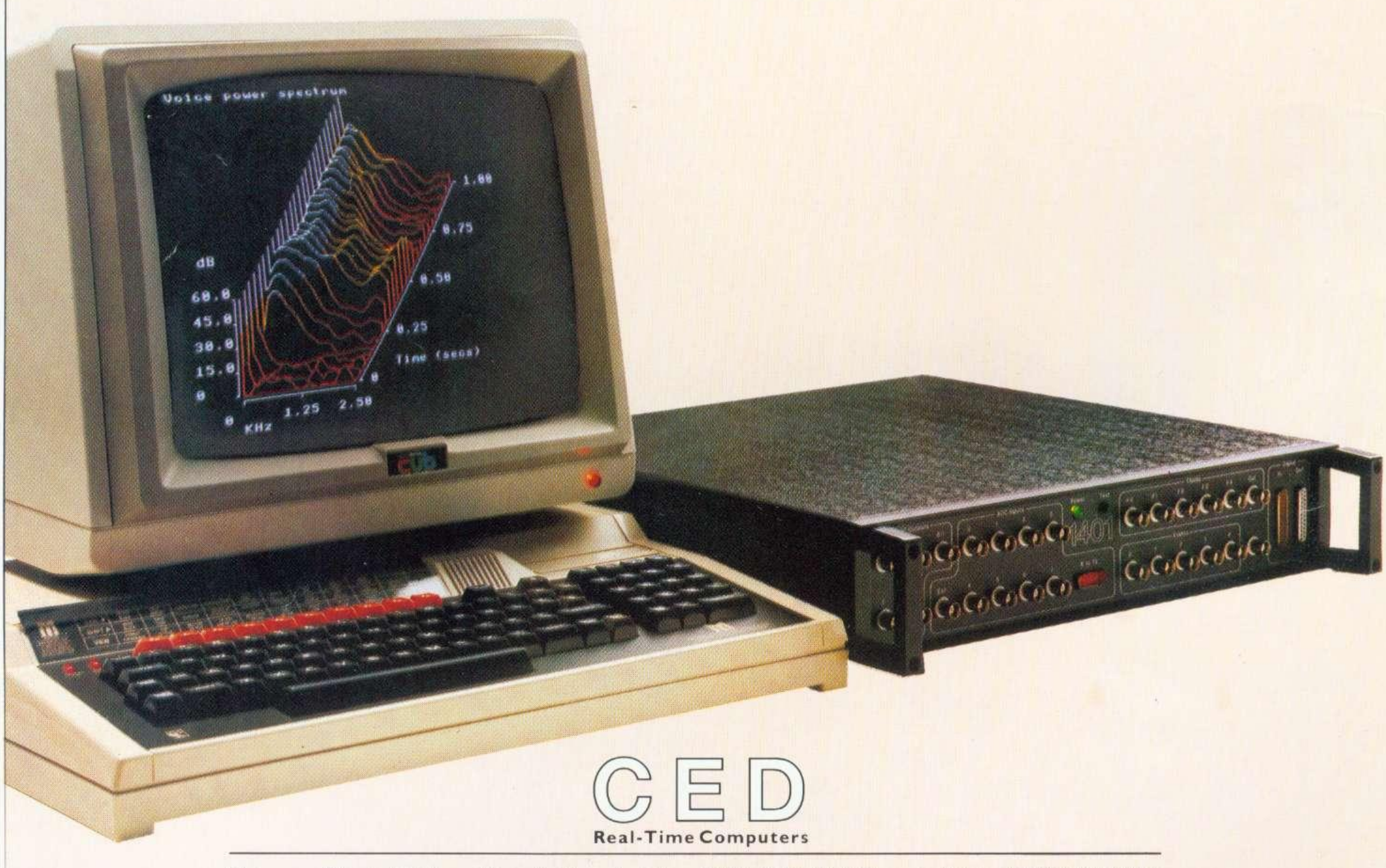
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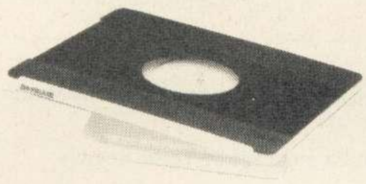
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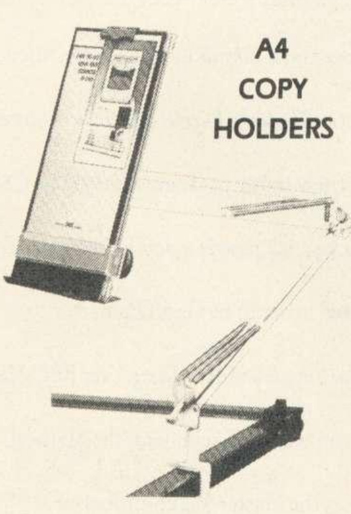
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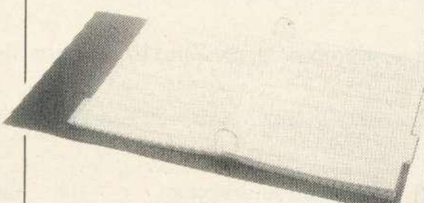
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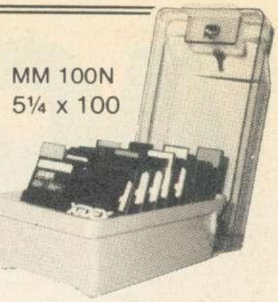
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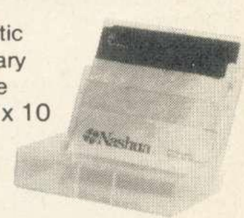


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ACORN USER

ISSUE No 50 SEPTEMBER 1986

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FEATURES

COVER



Cover illustration by John Clementson

NEXT MONTH

NEXT?
Amid all the rumours, we look at Acorn's future micro plans.
Spider curve plotter – for those awkward equations.
Wordprocessors for kids.
The secrets of Viewspell.
Turtle treats: get the most out of Logo.

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At last, speech synthesis at a price you can afford. SPEECH! works entirely in software taking up less than 9K of RAM: no extra hardware whatsoever is required. Unlike other systems, SPEECH! has an unlimited vocabulary: it will say anything you want it to, and is simplicity itself to use. Simply type in: ***SAY I AM A TALKING COMPUTER, AS EASY TO USE AS 1 2 3...** and the computer speaks.

SPEECH! has a built-in parser which translates English words into "phonemes", or speech particles. There are 49 phonemes and 8 different pitch settings which can be used directly by the *SPEAK command (e.g. *SPEAK/HEH4LOW4) so stress or intonation can easily be added wherever desired. You can change the overall pitch with the *PITCH command.

Every copy of SPEECH! comes complete with extra software:
DEMO — shows off all the features,
SPELL — an innovative educational program,
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Applications in:
- games
- education
- business
- utilities

THE RECENTLY RELEASED BBC MICRO VERSION HAS BEEN GREETED WITH ACCLAIM AND INCREDULITY:—

REVIEWS ON BBC-1 AND BBC-2 TV

Saturday Superstore (BBC-1)
"This is knockout! This is great!... Wonderful! Very, very clever."... Fred Harris

Micro Live (BBC-2)
"Really good value!"... John Coll

REVIEWS IN THE COMPUTER PRESS

"The reproduction is suprisingly good, and certainly on a par with some of the more expensive speech interfaces I have heard. An excellent low cost speech synthesiser that really is very good value for money."... ACORN USER

"... incredibly easy to use. The end result is as good as anything I've heard this side of the Amiga."... POPULAR COMPUTING WEEKLY

"Overall an excellent package"... MICRONET 800.

"This is one utility which cannot be beaten on quality or price"... The MICRO USER.

"SPEECH! from Superior Software is a truly remarkable offering. A rare gem indeed. Superior Software has produced a price breakthrough by achieving an apparent technical impossibility."... A & B COMPUTING.

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WE PAY TOP ROYALTIES FOR HIGH QUALITY SOFTWARE

SPEECH! was greeted with admiration and acclaim by the computer press

(for the BBC Micro)

"Overall an excellent package.
Value for Money 5
Presentation 5
Use of Machine 5
Ease of Use 4
Facilities 5
Effectiveness 4
Total Score out of 30: 28"
MICRONET 800, December 1985

"Superior Software's SPEECH! is a quite remarkable piece of programming. .... The program takes up 7½ K of program space and is incredibly easy to use. It merely requires a new command word which is SAY preceded by a *. ... The end result is as good as anything I've heard this side of the Amiga and it'll make a stab at even the most ludicrous words constructed without vowels and at great length. ... It is possible to add words to the computer dictionary where they are not said exactly as they would be, using phoneme analysis and also to vary the pitch of the spoken voice. ... Why pay more?"
Popular Computing Weekly, 19-25 December 1985.



"The reproduction is suprisingly good and certainly on a par with some of the more expensive speech interfaces I have heard. All in all, an excellent low cost speech system that really is very good value for money."
Bruce Smith, Acorn User, February 1986.

"SPEECH! from Superior Software is a truly remarkable offering. A rare gem indeed among the morass of mediocre to competent efforts which dominate a reviewer's postbag. In my view SPEECH! is an absolute breakthrough for the BBC micro which deserves to sell by the thousand. ... Superior Software has produced a price breakthrough by achieving an apparent technical impossibility. David Hoskins, the programmer, has cleverly programmed the sound chip to do things which its designers never intended it to do. ... A most practical application example also provided is a spelling checker. This has always been a problem case for educational software — how to test spellings without printing the word and revealing all. ... This program is well designed and effective and users are encouraged to customise it with their own examples. In short, SPEECH! is a very clever and useful program being offered at a silly price. If you were planning to buy another arcade game, take my advice and spend the money on SPEECH! instead."
Jonathan Evans, A & B Computing, March 1986.

"SPEECH! is the most talked-about package ever created for the BBC Micro. For the first time it endows your micro with the power of speech for an incredibly low price."
Christopher Payne, The Micro User, April 1986.

"If I were a manufacturer of a speech synthesis product I would be greatly worried by the arrival of SPEECH! This is one utility that cannot be beaten on quality or price.
SOUND 9
GRAPHICS .... n/a
EASE OF USE 9
VALUE FOR MONEY 9
OVERALL .... 9"
James Riddell, The Micro User, June 1986

COMPETITION COMPETITION COMPETITION COMPETITION

THE QUIZ

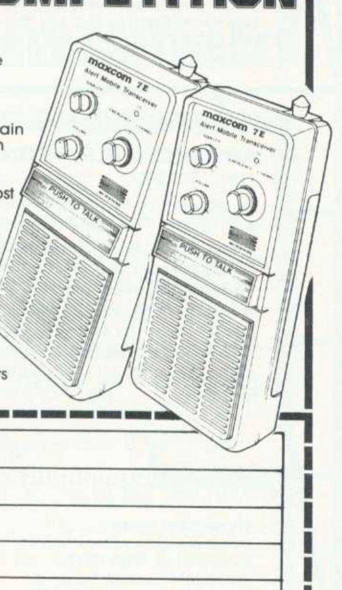
1. In which year did Superior Software release their first software cassette?
2. Can a computer be manufactured without using integrated circuits or transistors?
3. Which U.K. company manufactured the coin-operated arcade machine of the successful game Hunchback?
4. Name the author of Superior Software's SPEECH! program?
5. What was the name of the acclaimed home computer sold by Commodore before they produced the Commodore-64?
6. Which Superior Software game won the "Computer Gamer" Game of the Year Award for the Best BBC Game of 1985?
7. Name the Managing Director of Amstrad Consumer Electronics PLC?
8. Which of the following is not a valid phoneme representation as used in Superior Software's SPEECH!
EE UH C M NX ZH
9. What does the acronym ASCII stand for?
10. How do you spell the word "azure" phonetically in order to be pronounced correctly by the *SPEAK command of Superior Software's SPEECH! program?

Describe the most useful application of SPEECH! that you can envisage. (Please write your description on a separate sheet using more than 50 words, but not more than 200 words).

HOW TO ENTER
To enter, simply complete the 10-question quiz (on the left), and describe what you think is the most useful application for SPEECH! The completed entry form should be sent to Superior Software at the address given below.

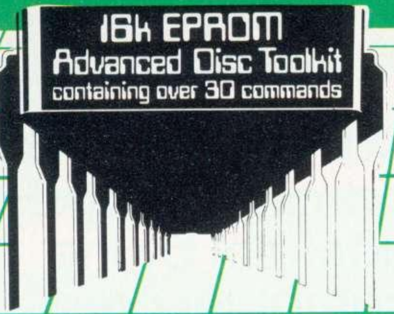
THE PRIZES
Each entrant who answers the 10 question quiz correctly will receive a colourful SPEECH! badge (pictured left). All correct entrants will then be considered for the main prize of a pair of professional walkie-talkies (valued at **£200**), a trophy, and the cash prize of **£100**. The winner of this prize will be determined at the close of the competition on 31st January, 1987. The winner will be the person who has correctly completed the 10 question quiz and, in the opinion of the judges, describes the most useful application of Superior Software's SPEECH! program.

RULES
1. All entries must be accompanied by a completed entry form and a description (on a separate sheet) of what, in your opinion, is the most useful application of SPEECH!
2. All entries must clearly show the sender's name, address and age (if under 18), and should be addressed to: "SPEECH! Competition", Superior Software Ltd, Regent House, Skinner Lane, Leeds LS7 1AX.
3. The closing date for receiving entries to the competition is 31st January 1987.
4. The company's decision is final and no correspondence can be entered into.
5. The competition is not open to the employees of Superior Software Ltd, the authors of SPEECH! their agents or their families.



1		6	
2		7	
3		8	
4		9	
5		10	

Name ____________ Age (if under 18) ____________
Address ____________
____
Telephone ____________



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(supplied on 16K EPROM + DFS MANUAL)

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(06) /M/B/E/ **£28.75**

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40track discs to 80track discs, verify two non-standard discs.
("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" ... Tublink on Prestel)
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ADVANCED ROM MANAGER
(07)/M/B/E/ ***£14.95***

A friendly utility for ROM & sideways RAM. Examine ROM/RAMs, load files into RAM, move memory to/from SWays ROM/RAM, catalogue/kill ROMS, offer commands to specific ROMS, save ROMs to disc/tape, AUTOROM a file (inc. BASIC) to run from SWays ROM/RAM, execute specific machine code subroutine in a ROM, generate a ROM's checksum & CRC.
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...AP4 should be considered the standard interface for the Electron (AU July '86)

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(09)/E+1/ **£66.70**

A triple interface cartridge providing...
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2) a 1 MHz BUS for control applications & prommers
3) the USER PORT for mouse and graphic devices.
Also contains 2/3 ROM sockets and on board operating software for 2nd processor.

ADVANCED 1770 DFS
3 versions ADM (11) - ADB (12) ADE (13) **£34.50**

ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is probably the fastest & most powerful disc filing system your computer could have. With the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC.
(16K EPROM + comprehensive manual)

ADVANCED ELECTRON DFS Eøø
(14) /E+ASR/ **£19.99**

An alternative to our AED(05) for Plus 3 and ASR users. This optional alternative DFS is designed for use in Sideways RAM (ASR) and allows the user to operate a disc filing system &Eøø when using the Plus 3 (in ADFS page would normally be &1Døø). The DFS is simply loaded using the software supplied with the ASR from disc. (optional upgrade for existing AED users £9.50 on return of original EPROM) (3½" ADFS disc + manual)

OTHER PRODUCTS & SPECIAL OFFERS

VIEW cartridge	(101)	/E+1/	£15.00
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AP4 100	(140)	/E+1/	£198.97
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Equipment codes /M/ = Master /B/ = BBC /E/ = Electron /E+1/ = Electron + Plus 1

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NEWS

News in brief

● Slogger's Master Ramboard gives the Electron as much memory as a second processor. It acts as shadow RAM, giving up to 28k for Basic and applications, or as a 28k printer buffer.

The kit costs £54.95, or you can send your Electron to Slogger and it will fit the board for £64.95. Slogger is on (0634) 52303.

● Watford has launched the Printer Driver ROM for *View* users at £32 + VAT. It includes facilities to define pad characters, printer pauses to change daisy wheels, fonts and text colour.

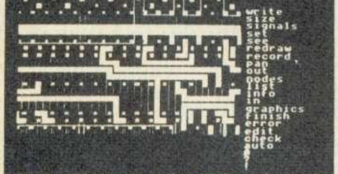
● Acorn's network database, *Supastore,* can be accessed by several users at a time over Econet.

The menu driven program is held in an 8k ROM. Data is held in record format, and the records can be searched using up to 10 criteria.

● The first two software pirates have been prosecuted under the Copyright Act. In separate cases, two men were fined £200. Several other cases are pending.

● Qudos has released two packages for people who want to design their own chips.

Quickchip is a complete hardware and software system, based on the 32-bit Acorn Cambridge Workstation. It includes a 20M hard disc, networking and communications interfaces, and CAD



Design a chip with *Quickchip*

software for £7500. Designs can be sent on disc to Qudos who can return the chips in weeks.

A lower level version of the software is available for the BBC micro at £500.

Details on (0223) 862333.

Master to drive video disc

Acorn has produced a special interactive video version of the Master ready for Domesday.

The BBC's Domesday Project is nearing completion and the company has revealed details of how the end product will look, including a specially modified Master to control the video disc player.

The Domesday Project is the most in-depth survey of the United Kingdom ever undertaken. Led by the BBC, it involves Acorn, Philips, Logica, the Department of Trade and Industry and about 14,000 schools.

The product of all this activity will be a database of over 50,000 pictures and 150,000 pages of text contained on two double-sided video discs. There are maps of all parts of the UK. Text and pictures can be found using keyword searches. You can take simulated walks around parts of the country and graphs and charts can be created from some of the data.

The discs are played on a Philips LaserVision player controlled by the new Master AIV computer. For the record, it's essentially a Master Turbo fitted with a small computer system interface – a bi-parallel interface, capable of handling large amounts of data.

The new Master also has a Videodisc Filing System (VFS) ROM to handle the blocks of text, still and moving pictures.

Acorn expects that most people will buy the complete system – player, micro, RGB monitor and tracker ball – as a factory-assembled package. However, existing Turbo owners can upgrade.

The whole system is based on the LaserVision LV-ROM standard (similar to CD-ROM), so the system may attract large businesses and teacher training establishments who can use it to run existing training packages.

The system is planned to appear shortly before Christmas, although the price hasn't yet been fixed. Promotion is already under way, however, with the BBC sending a videotape simulating the Domesday database to key people in education and business. Acorn's Chris Turner said that 'the reaction to the video has been very encouraging.'

More details from Broadcasting Support Services (Domesday), PO Box 7, London W3 6XJ.

New battery pack for the Master

Acorn has cleared up the confusion surrounding the battery replacements on the Master.

Replacements for the original lithium battery, which could overheat as a result of reverse charging, are already being sent out. But some people are concerned that the new battery pack takes up the space, between the power supply and main board, originally reserved for an internal modem or video disc interface. Masters being manufactured now will have this fitted as standard.

The replacement kit consists of three Duracel batteries taped to a metal support plus a new battery nest. But future replacements, and future Masters, will have a completely new plastic mounting, similar to the original but capable of taking three cells rather than one.

Anyone who has an internal modem or video disc interface installed will also have the new battery mount fitted.

Around 22,000 Masters have been sent out with lithium batteries. Acorn has notified all its dealers, local education authorities, regional health authorities and service centres about the replacements and will be taking advertisements in magazines.

Ring Acorn on (0223) 214411.

FREE SOFTWARE!

That's what we're offering to readers this month to celebrate our 50th issue. The first 100 readers (10 reserved for overseas entries) who send in the coupon below will receive a free copy of this month's listing disc or cassette (state which).

So fill it in, clip it out and send the coupon to: 50th Birthday Offer, Acorn User, 141-143 Drury Lane, London WC2B 5TF.

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Ac. U. 9/86

Faster, cheaper Prestel service

Prestel has announced major changes to the system, speeding up the service by allowing keyword searches and faster access rates, and dropping time charges for educational users.

Most of the technical changes should be with us in the next year, but some will not be as advanced as most people had hoped.

Keyword searching will only work on indexes – the main menus at the head of a specific section of pages. Entering *NEWS, for example, would take you to the main news menu. But you won't be able to search the text itself for specific words. The software for this is currently being tested on the Kipling computer.

This improvement should make Prestel and sub-sections like Micronet faster to use, by cutting out a number of intermediate pages and making directories of page numbers unnecessary. But it is not the kind of database service that many people hoped for.

On the messaging side, users will be offered features such as acknowledgement of receipt and the facility to forward incoming messages to third parties, having attached their own comments.

As with Telecom Gold, you will be able to scan awaiting messages without reading them in full, and reply to ones you have read with the system filling in the recipient's mailbox number for you. Other improvements include longer messages and mailing lists. The bad news is that most of the changes will take around a year, and some of them won't be with us for two years or so.

People who start to use the system more might appreciate the new high speed data modes. By the middle of next year most of the country should be able to access Prestel at 1200 and probably 2400 baud both ways.

On the educational front, Prestel is offering a new tariff. Schools may pay £192 per year, rather than £80, but with no time charges. At 4p a minute with the existing system, any school which accesses Prestel for more than 47 hours per year will benefit.

Check on data users

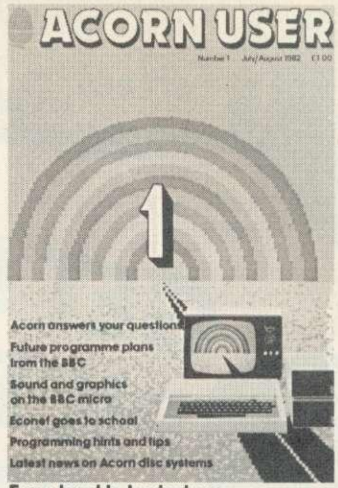
We may soon see the first court case as a result of the Data Protection Act. The registrar is now examining ways of enforcing the act, a task not dissimilar to finding TV licence dodgers.

Complaints are generating a lot of the investigation work, but the registrar is not relying on them. His staff will be actively pursuing data abusers.

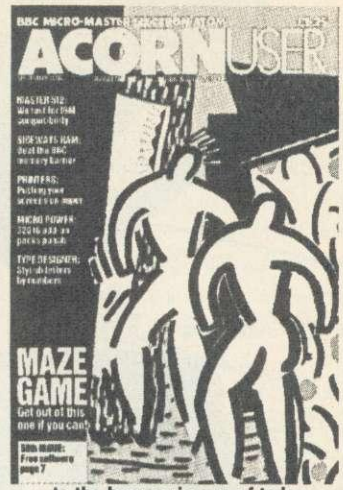
Once the information about registered data users has been put on to computer files, the Registrar's Office will compare the list of registered users against what the registrar calls 'published lists of potential data users'. These will include trade and other similar directories.

The full force of the law for prosecuting people who misuse data will not be available until November 1987.

But people can already be prosecuted for non-registration. John Lamidey, in charge of investigations, told *Acorn User:* 'There will be a prosecution as soon as we can prove it.'



From humble beginnings . . .



. . . to the bumper issues of today

An interesting year to be 50

ACORN USER celebrates its 50th issue this month. Four years have seen a lot of changes and 1986 will see more than any other since the launch of the BBC micro. Already we've seen the Master, the first worthwhile change since 1981, and there's more to come.

Acorn appears to be almost out of the financial quagmire, although the pruning can be seen in the lack of back-up on the Master and the profiteering on manuals. Problems with the Master have led to fears that show the company still retains the marketing and PR skills of a brick.

The RISC factor

However, faith in the company is strong. The Master is a good computer and there's RISC power on the horizon.

Will Acorn come out of the educaton closet and tackle the home market?

If Acorn is going to 'do an Amstrad', it had better be done well. Can the company put together advertising as good as Alan Sugar's. The promised campaign for the Master has yet to be seen (or did we all miss it?).

And what effect will the 'internationalisation' of Acorn by Olivetti have?

More questions than answers, I'm afraid. At present I'm going through all the reader survey forms you've sent us. Editing a magazine like this takes you away from the grass-roots readership, but there's nothing like a hundred survey forms to chop your legs off at the knees and bring you down to earth. You'll be seeing the results before the end of the year.

Write on

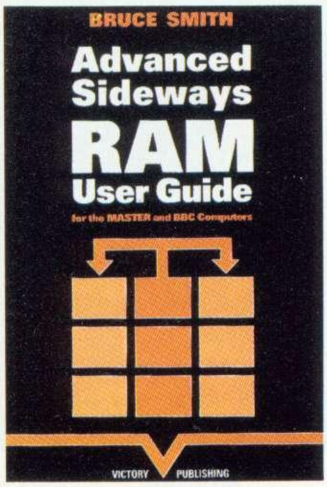
For the rest of the time I have to rely on feedback. Keep the letters coming – and send some to Acorn as well. The big boss Brian Long is undoubtedly short of user comment that hasn't been filtered and turned into those damned lies called statistics.

Finally, a plea to the silent majority – women. Things have changed little since my first editorial on the subject more than two years ago. Computing is dominated by men for men. A friend told me earlier she'd rather spend £500 on riding every weekend for a year than on a micro. I can't argue with that.

Still, bigger chips will mean computers can start to do things properly, and Acorn has a good one. It's called RISC. Tell Acorn how to use it.

Tony Quinn
Editor


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ROM TITLE
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BCPL
TOOLKIT
DFS
WORDWISE
GRAPHICS EXTENSION
BBC
GIANT
TEXT
Press RETURN when finished.
Body



Bruce's book

The secrets of sideways RAM are laid bare in a new book by *AU* Technical Editor Bruce Smith.

Advanced Sideways RAM User Guide for the Master and BBC Computers covers Acorn's ROM filing system, compatibility tables, a formatter to convert Basic programs to work as ROM software, details of all the SRAM utilities in the Master and full details of how it all works.

All service calls are covered, including the extra ones provided on the Master. There are also 25 programs and routines which illustrate the techniques.

The book costs £9.95. Discs containing the programs in the book are available in Master and BBC versions at £7.95 each, or you can buy the book and disc together for £14.95. All prices include postage. Order from Victory Publishing, PO Box 19, London N11 1DS.

Too many ads

Acorn User has had to reorganise the system for free ads because far more are received each month than we can possibly publish.

If you sent in a free ad which was received before Monday 14 July and it is not in this issue then it is unlikely to be published. From now on, this method will be used and any extra ads which do not make an issue will be disposed of. We hope this will lead to a more efficient service.

Carve your CAD designs

A new CAD package from Technomatic lets you carve your designs in wood, glass and plastic.

The basic graphics workstation system consists of a three-colour plotter, software and attachments. There is an opto-sensor which can scan a picture to produce a digitised image, which can then be enhanced and modified by the software. This is particularly useful for correcting any glitches in the scanned picture, where bits have dropped out or the sensor has had trouble reading details.

Most interesting is the drill rotor attachment. This can take a variety of bits, including a diamond tool to engrave glass. Other bits are used for wood and plastic. Most types of wood can be used, but some plastics have problems with the heat generated by the drill bit.

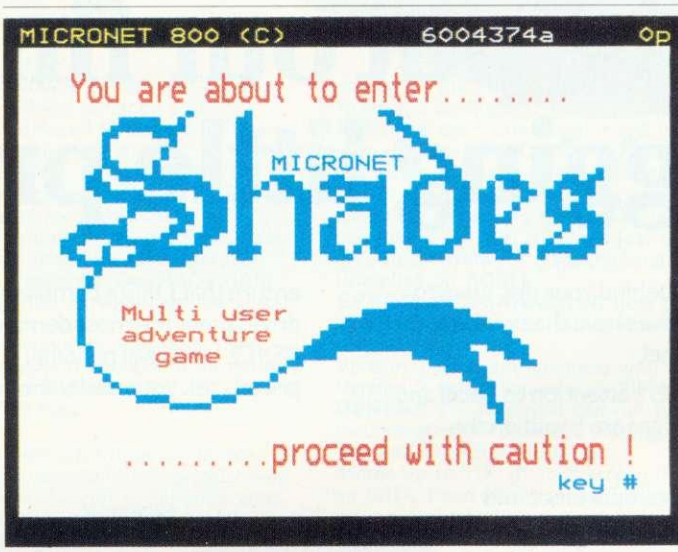
The outfit interfaces with Technomatic's *Novacad* design software. This effectively allows three-dimensional modelling. You can produce two-dimensional designs on up to eight discrete levels. When it comes to transferring the design to wood or plastic each level is plotted individually. By changing the height of the drill bit after each plotting operation, you can produce three-dimensional carvings.

Possible applications for this, apart from producing works of art, are building models of street plans and creating moulds.

You can also attach other devices. The people at Technomatic have used an airbrush with the plotter to produce repeatable colour paintings.

The cost of the package starts at around £630 with an A3 plotter. Systems can be put together to your own specifications with plotters up to just over A0 in size. The *Novacad* software is sold separately for around £80.

Details and prices are available from Technomatic, 17 Burnley Road, London NW10 1ED. Tel: 01-208 1177.



Free modems from Micronet

Micronet is giving away modems. Following the lead of the French Teletel system, which gave free viewdata sets to customers, anyone taking out a full year's subscription to Prestel and Micronet will receive a Prism 2000 modem and viewdata ROM.

It now means that getting on to Micronet and Prestel will cost you just under £50 for hardware, software and membership.

Micronet is also giving away money by launching a £1000 software competition. The prize is for a program that increases awareness among able-bodied people of the problems that society creates for the handicapped.

The closing date is 30 November, and more details are available from Micronet or from David Wrinch, PHAB, Tavistock House North, Tavistock Square, London WC1H 9HL.

Finally, the multi-user Micronet game Shades (above) is now planned for an early September launch. It is currently being tested by a few avid games players whose job is to uncover the bugs. There will be no subscription charge for the game but there is a time charge of 99p an hour.

Health fears in the House

Controversy continues to bubble in the Commons over whether classroom computer monitors are a potential health hazard to pupils. One backbencher who is worried about the long-term effects of VDUs is Gerry Bermingham, Labour Member for St Helen's South. He wanted to know just what research had been carried out by the Government into the effects of VDUs on children.

The Health Minister Ray Whitney, replied that no research was being carried out at present, and added: 'None is planned as I am advised it is not warranted.'

Nor, he said, had the Government received any representations about the health effects of monitors on children. 'There is no indication that children in general are at risk from using visual display units,' insisted Mr Whitney.

Mr Bermingham was surprised at the Minister's dismissive response. In particular he was put out by the Whitehall attitude in the light of widespread concern voiced over the effect of VDU screen radiation on pregnant women. The Minister's reply, he complained, was 'short-sighted'.



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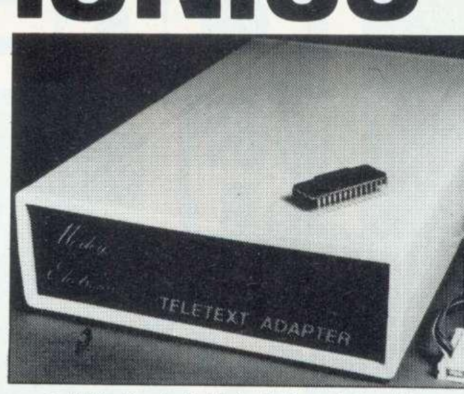
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- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.



- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

ELECTRON TELETEXT ADAPTER
Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs. Please ring for details.

Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.
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FEATURES
1 Megabyte of RAM connected to the 1 MHz bus.
Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.
The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any DFS.
The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.
'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
Catalogue structure allows up to 2,709 files.

APPLICATIONS
Programs and ROMs can be written to take advantage of directly accessing a single RAMdisc, allowing the possibility of spreadsheets with more than 512 × 512 cells, million-character documents with immediate access and editing of any section, manipulation of 2 floating-point arrays each with 228 × 228 elements, a fast-access database with 10,000 100-character records, or even just a large printer buffer!
Accessible through the user's software for direct storage of eg: basic procedures, variables, large arrays etc which can be downloaded into the BBC's RAM or read directly. (We are hoping to be able to supply an extended basic ROM late this year, to allow 'transparent access' to the Ramdisc, which will effectively expand the BBC's RAM to about 1020k.)

OPTIONAL SIDEWAYS RAM UTILITY (suitable for use with any 16k SWR)
Sideways ROM images can be saved to the RAMdisc under a special directory which, when enabled, will be used when an unrecognised * command is trapped for the ROM to load sideways ROMs from disc into sideways RAM. The * command will then be passed to the new ROM image and if still unrecognised the next ROM will be loaded. If no ROM loaded from the RAMdisc intercepts the * command it will be passed to the current filing system as usual. ROMs on RAMdisc can be individually disabled in the same manner as 'real' ROMs in the BBC itself. Up to 104 8k ROMs can be saved onto the standard 1Mb RAMdisc, and the total load time (excluding time taken by the ROMs to process the command) for 100 ROMs is just under 9 seconds. All relevant control software for disabling/enabling ROMs etc. is provided. (Supplied on ROM.)



EPROM PROGRAMMER now available programs 8, 16 and 32k EPROMS connects to the user port software available on rom or disc.
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Qty. ☐ Teletext utilities on Disc	@ £5.95 inc. VAT & P&P.	Qty. ☐ Eprom Programmer V.2	@ £27.95 inc. VAT & P&P.
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The Nucleus 20 from UFD

Well they say two's company and three's a crowd, but not with the new Nucleus 20 from UFD.

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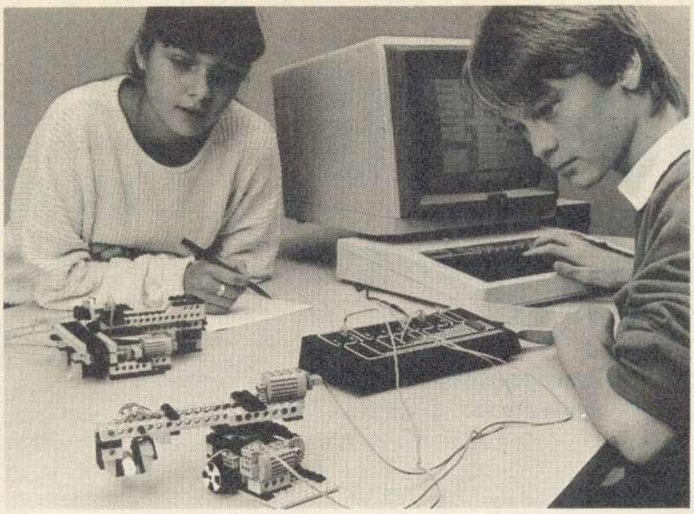
Another colour card for the BBC micro has arrived, this time from Focus Electronics. It uses the standard BBC colours but allows you to define the colour palette for each line of the display.

In a two colour mode, for example, each scan line can have only two colours, but these can be different from the previous line, and the next can be different again. So you have access to all the Beeb's colours in mode 0.

Programming the card is easy as it uses an extension of the VDU23 command. And the operating software has been written legally so it should work with other software, such as the Graphics Extension ROM. Its presence is practically transparent to the machine, and output is through the normal video ports.

The card is installed by removing the video ULA chip, plugging the card into the empty socket and plugging the ULA into the card. The product is intended for BBC B owners – Focus cannot guarantee that it will work on a Master.

The price is £65 plus postage, and details are available from Focus Electronics, 26 Hamwick Green, Lordswood, Chatham, Kent ME5 8TW.



Beebs create jobs

A pioneering project with BBC micros is putting severely handicapped people back to work.

It started three years ago at Stoke Mandeville and Oldstock hospitals, and boosted the number of patients finding jobs tenfold.

Dr Julia Schofield, herself blind, started the project by suspending BBC micros on special cradles above patients who were confined to bed in traction. The patients had severe spinal injuries and the first thing they did was to read about their condition from text files created with Microtext.

Games and wordprocessors were added with tutorial discs. From playing games and writing letters, patients soon gained computing skills to earn them jobs.

Now 40 patients are back at work. The success stories include the former helicopter pilot who is now running a publicity company, and the one-time building apprentice who provides an estimating service for builders and plumbers.

Dr Schofield has expanded the scheme to four other hospitals in Britain and is also working in Australia, Canada and the far East.

Julia Schofield, 16 King St, Richmond, Surrey TW9 1ND.

Robotic Lego

Lego has moved into the micro market with a new series of robotics kits, pictured left.

Designed for schools, the kits will be sold through specialist dealers. They are based on the technical Lego system which includes gears, motors, pulleys and other mechanical components as well as the usual bricks.

The software is called *Lego Lines,* and is designed to provide a painless introduction to setting data lines. The eight lines of the user port can be set and monitored and their status is displayed on the screen as coloured squares. The interface is a simple switching device providing six output and two input lines. The status of all eight lines is displayed by LEDs on the unit.

A typical outfit for three pupils, including software, interface, teacher's guide and student materials, as well as a load of bricks, is expected to sell for around £200. For more details contact Lego UK Ltd, Ruthin Road, Wrexham, Clwyd LL13 7TQ. Tel: (0978) 266949

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AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

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If you want advice on hardware or software, or a list of addresses, send us your problems.

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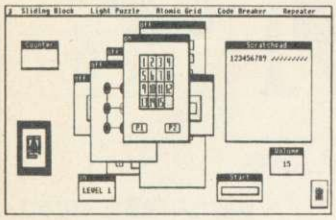
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AU 9



Play games with your mouse

Advanced Memory Systems, the company that produced the AMX mouse, has taken a break from business and graphics and has launched games designed to work with its popular rodent.

AMX Mind Games is a collection of five puzzles and brainteasers. It includes a sliding block puzzle, memory and code-breaking games (see screen dump above). In contrast, *AMX Zap Zone* is straightforward arcade action, but with all movements controlled via the mouse.

More details on these products are available from AMS, 166-170 Wilderspool Causeway, Warrington WA4 6QA. Tel: (0925) 413501/2/3.

DIY 3in drives

Some new and very inexpensive disc drives have been announced by Matmos. But you will have to have a certain amount of interest in DIY to make use of them.

The drives are 3in, 40-track models, giving an unformatted capacity of 250k per side. A single sided drive costs £29.95 and double sided is £39.95, plus a data lead at £10.

However, the drives are uncased and come without a power supply, although cases can be supplied and the company will advise on suitable power units.

Until now, 3in discs have been hard to get hold of but rumour has it that large stocks are on the way. The main problem will be a lack of commercial software in this format, but that may not bother home programmers.

Details on the drives are available from Matmos Ltd, 1 Church Street, Cuckfield, West Sussex RH11 5JZ. Tel: (0444) 414484.

'Phase out Basic in schools'

by Bill Penfold

Classroom computers should stop using Basic according to a report commissioned by the Government, which says it is time micro education moved on to more powerful languages.

The advice has come from the Advisory Council for Applied Research and Development – ACARD – which has completed a detailed and highly critical analysis of the future of the British software industry.

Most of the report concentrates on the bleak prospects of the small and diverse British industry in competition with the increasing might of the American giants and other foreign rivals. But ACARD also produced a handful of recommendations for micro education.

For starters, the 12-strong team of experts called on schools to teach touch typing and 'mouse' skills as basics. It also recommended more teaching of mathematics relevant to understanding Information Technology.

It suggested that Computer Studies for pupils under 16 should be based on sound problem analysis and structured program development. But the experts made it clear they want to see an end of Basic, including the Beeb's.

'The teaching of Basic should be phased out as more powerful systems become available,' they maintained.

The ACARD working party included representatives of software houses, INMOS, the Alvey Programme, British Aerospace and Oxford University's programming research group.

Its overall conclusion on the prospects for the future of the British software industry was one of gloom. 'Foreign companies and multinationals will dominate the world and UK markets in the 1990s,' the report predicts. 'The UK market alone is too small to sustain a world class software industry.'

To survive, the experts have advocated much more training in computing skills, from the boardroom to the shop floor.

Part of that training is clearly seen as starting in the classroom. As a start, it proposes the construction of a common core syllabus for Computer Science at A-level. This should include 'a good groundwork in the mathematical aspects of software engineering, as well as its practical application'.

Download hi-res graphics

High resolution graphics screens can now be downloaded from Prestel. The Mouselink section of Tubelink, which is found on the Viewfax database, is providing pictures created with packages like *AMX Super Art* and *Pagemaker*, which you can download to disc for later viewing.

The software that has made this possible is a machine-code compaction routine developed here at *Acorn User*. This means that only 1-2k of data is transmitted, rather than 20k. A decompaction program is available for downloading, along with the picture files.

Users are also encouraged to submit their own works of art. The screen files should be on disc, and sent to Mouselink Pics, PO Box 641, London NW9 8TF. Mouselink can be found on Prestel on page 2582182.



Graphics screens via Tubelink

Computers and health

A conference covering the use of computers in healthcare education and training is being held at Keele University in September. CBT '86 is the first conference of its kind and aims to cover subjects ranging from management techniques to the use of interactive video.

The conference will look at techniques such as computer managed learning, expert systems and artificial intelligence, and communications and information systems. Delegates are expected to include health service managers and senior teachers from the caring and remedial professions (nurses, occupational therapists and the like).

The conference runs from 22 to 24 September and a total of 280 places are available. Further details can be obtained from Stephen Ward, 164 Windsor Road, Ashton-in-Makerfield, Wigan WN4 9ES. Tel: (0942) 712385.

New SRAM group

A user group for Solidisk owners has sprung up in Scotland. Calling itself Solinet, the group aims to circulate a monthly newsletter on disc containing articles, hints and tips on sideways RAM.

Membership is free, although members are asked to submit their own discs in order to keep costs down. For more information contact Andrew James, 6 Torrinch Drive, Balloch, Dumbartonshire GB3 8JL.

USER GROUPS

LONDON

London. Association of London Computer Clubs: Robin Bradbeer, Polytechnic Of North London, Holloway, London N7 8DB
London. Association of Computer Clubs: Rupert Steele, 12 Philbeach Gardens, London SW5 9DY
London. Radio Amateur Micro User Group: contact by bulletin board No 86300198
East London. SOBAT Computer Club: Mr T. A. Kayani, 12 Calderon Road, London E11 4EU. Tel: 01-556 5423
North London. BBC Micro Users Group: Mr Ric Keyworth, 'The Penthouse', 4b Kilburn High Road, London NW6 5UL Tel: 01-734 9235
North London. North London BBC Micro User Group: 82 Hornsey Lane, London N6 5LU Tel: 01-263 6760 (eves)
Wandsworth. Wandsworth Computer Club: C. Kendrick, Earlsfield Library, Magdalen Road, London SW16
West London. Personal Computer Club: Chris, tel: 01-743 1579; Steve, tel 01-540 6271; Blue, tel 01-579 5415

SOUTH-EAST

Aylesbury. BBC Micro User Group: Aston Clinton County Combined School, Twitchell Lane, Aston Clinton, Aylesbury, Bucks HP22 5JJ Tel: 0296 630276
Bognor Regis. Bognor Computer Group: E. R. Piper, 2 Ely Gardens, Aldwick Park, Bognor Regis, Sussex PO21 3RY
Bracknell. Bracknell Primary Schools Computer Users Group: D. Donaldson, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
Brighton, Hove & District. Brighton, Hove & District Computer Club: J Smith, 30 Leicester Villas, Hove, E. Sussex BN3 5SQ
Bucks. South Bucks Acorn Computer Club: David Park, 160 White Hill, Chesham, Bucks HP5 1AZ Tel: Chesham 783097
Camberley. Camberley Computer Users Club: David Crosby-Clarke. Tel: Crowthorne 771590, Prestel mailbox 344771590
Carshalton. Acorn Atom User Club: Kevin Roll, 66 Shaldon Drive, Morden, Surrey Tel: 01-540 5282
Caterham. Computer Club: Caterham Leisure Centre, Godstone Road, Caterham, Surrey CR3 6RE.
Dartford. CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent Tel: 0322 22669
Guildford. West Surrey Computer Club: Jan Spencer, 52 Lindfield Gardens, Guildford, Surrey GU1 1TS. Tel: 0483 63512
Harpenden. Harpenden Microcomputer Group: P. Cowley, 36 Southdown Road, Harpenden, Herts AL5 1PG
Harrow. Harrow Computer Group: Bazyle Butcher, 16 St. Peter's Close, Bushey Heath, Watford WD2 3LG Tel: 01-950 7068
Ilford. ILBUG: Peter Jones, 1 De Vere Gardens, Cranbrook, Ilford, Essex IG1 3EB. Tel: 01-554 9825
Iver. Iver Computer Society: John Haigh, 11 Colliston Walk, Ford's Farm, Calcot, Reading, Berks RG3 5ZJ Tel: 0734-417534
North & Mid Essex. User Group (NAMEBUG): Andy Purkiss, 12 Palm Close, Witham, Essex. Tel: 0376 515609 Prestel: 376515609
Reading. Reading User Group (RUG): Tel: Richard Rowlands, Tel: Reading 596825 (eves)
South East Essex. BBC User Group (SEEBUG): Miss J. Lines, 97 Oakhurst Drive, Wickford, Essex SS12 0NW Tel: 03744 63396
Sutton. Sutton Library Computer Club: The Secretary, 21 Village Row, Sutton, Surrey SM2 6JZ Tel: 01-642 3102
Welling. Computer Users Club: Tony Latham, 69 Hadlow Road, Welling, Kent DA16 1AX

SOUTH & SOUTH-WEST

Alton. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW Tel: Alton 87478
Bristol. Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA Tel: 0272 799979
Fareham. Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP
Gosport. Borough of Gosport BBC Users Group (BOGBUG), Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE Tel: 0329 282221 (evenings)
Radio. AMRAC (Amateur Radio and Computers): Mr T. Triggel, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD Tel: 0590 612130

MIDLANDS & ANGLIA

Boston. Boston Acorn Computer Users Club: J. C. Goodwin, 245 Church Green Road, Fishloft, Boston, Lincs PE21 0RP
Burton-on-Trent. Beeb Users' Group (Bug Club): Mrs Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL Tel: 0283 216445 (eves)
Cambridge. Bottisham Acorn User Group: Peter Rank, tel Cambridge 812080, or Gerald Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA Tel: Saffron Walden 23793
Derby. The Derby Microcomputer Society: F. Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH Tel: Derby 559334
Glossop. Glossop Computer Club (Derbyshire): T. S. Fox, 4 Park Lane, Little Hayfield, Stockport, Cheshire SK12 5NW Tel: 0663 44260
Huntingdon. RAF Personal Computer Association: Sqn Ldr J. A. Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
Norwich. Amateur Computer Club: Andy Leeder, Church Farm, Stratton St Michael, Norwich NR15 2QB
Norwich. Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dareham, Norfolk NR20 5PS Tel: Foulsham 579
Nottingham. Micro Club John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR. Tel: 0602 225660 Prestel: 602225660
Redditch. Redditch Computer Club: Anthony Green, 14 Radway Close, Redditch, Worcs B98 8RZ Tel: 0527 61434
Stoke. POTBUG BBC User Group: J. Forest, 50 Cliff Street, Smallthorne, Stoke-on-Trent, Staffs Tel: 818430
Stratford. Stratford Computer Club: Chris Parry, 15 Kipling Road, Stratford-on-Avon Tel: 0789 68080
Suffolk. West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St, Edmunds, Suffolk IP33 2NJ

NORTH-WEST

Cheshire. Mid-Cheshire Computer Club: Michael Christie, 496 The High Street, Winsford, Cheshire
Cumbria. West Cumbria User Group: P. Majid, Tel: 0946 62732 or K. Purkiss, Tel: 0946 66586
Liverpool. Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH
Rochdale. Rochdale BBC Micro User Group: c/o 6 Dunbar Grove, Darnhill Estate, Heywood, Lancs OL10 3QJ
Wirral. Wirral Micro Users Club: David Walsh, 28 Priory Close, Bebington, Wirral, Merseyside L63 3EG

NORTH-EAST

Huddersfield. Huddersfield BBC Micro User Group: S. Gill, 21 Mayfair Avenue, Sowood, Halifax, W. Yorks. Tel: 0422 73058
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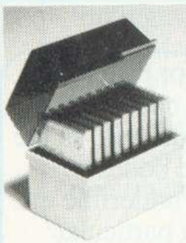
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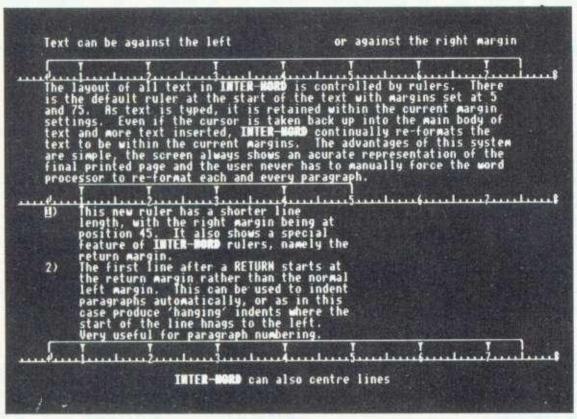
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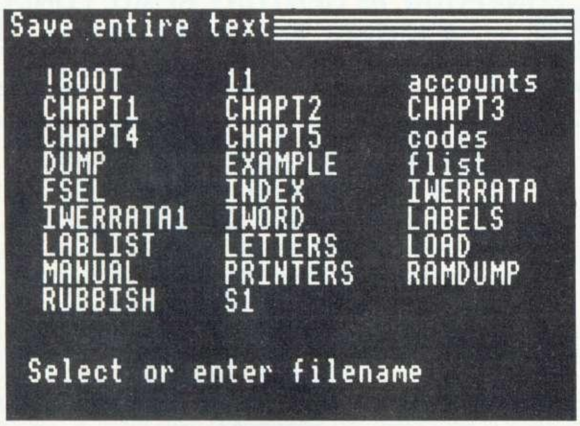


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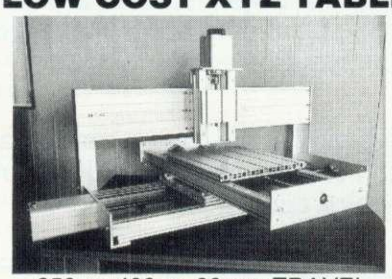
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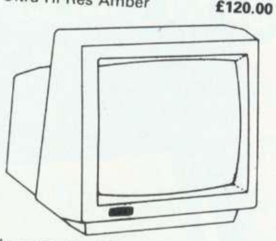
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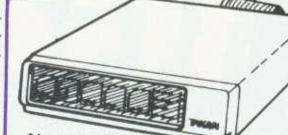
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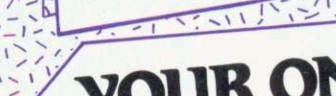
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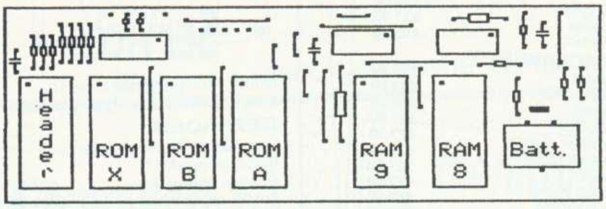
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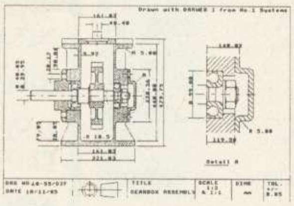
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See details on page 5.

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HITACHI 672 PLOTTER	£454 (a)
GRAPHICS WORKSTATION	£609 (a)
LINEAR GRAPHICS PLOTMATE A4 PLOTMATE	£299 (a)
A4M PLOTMATE	£399 (a)
A3M PLOTMATE	£549 (a)

PRINTER SHARERS & BUFFERS

BUFFALO 32K
32K parallel buffer for internal fitting to most EPSON/Epson compatible printers. — £75 (c)

TECHNO SHARER BUFFER
A unique sharer/buffer connects upto 3 computers to a single printer with auto scan and switching to computer outputting the data. Printer PAUSE, COPY and CLEAR facility. Mains powered, two buffer sizes 64K & 256K

TSB 64	£199 (b)
TSB 256	£275 (b)

PERIPHERAL & COMPUTER SHARERS
High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

		Parallel		Serial
3 Computers to 1 Printer	36v36-3	£69 (c)	25v25-3	£65(c)
4 Computers to 1 Printer	36v36-4	£85 (c)	25v25-4	£75(c)
2 computers/2 Printers X-over	36v36-x	£69 (c)	25v25-x	£65(c)
BBC Cable set 3 to 1 (1m ea)		£32 (d)		£34(c)
BBC Cable set 4 to 1 (1m ea)		£39 (d)		£41(c)

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable — £19.50 (c)

DISC DRIVES

Full details on page 4.

5.25" Single Drives 40/50 switchable:

TS400 400K/640K — £103 (b)

PS400 400K/640K with integral mains power supply — £114 (b)

5.25" Dual Drives 40/80 switchable:

TD800 800K/128OK — £205 (a)

PD800 800K/1280K with integral mains power supply — £229 (a)

PD800P 800K/1280K with integral mainspower supply and monitor stand — £249 (a)

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WINCHESTER DRIVES

P20 HD 20 Mbyte Hard Disc with ADFS Compatible	£669 (a)
P204HP 20 Mbyte Hard Disc, 80T DS floppy in a monitor stand	£865 (a)
P2041HT As P204HP and a 10 Mbyte tape streamer, with backup utilities	£1579 (a)
3.5" 80T DS Drives: **TS351** single 400K/640K	£89 (b)
PS351 single 400K/640K with integral mains power supply	£99 (b)
TD352 Dual 800K/1280K	£155 (b)
PD352 Dual 800K/1280K with integral mains power supply	£169 (b)

DISC DRIVE MULTIPLEXER

Full specification on page 4.

TDM2 Dual Unit: 2 computers/one drive unit	£75 (b)
TDM4 Quad Unit: 4 computers/one drive unit	£135 (b)

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD 4	£10.50 (d)
745 40T DS DD 3	£12.75 (d)
746 80T SS DD 3	£16.50 (d)
747 80T DS DD 3	£16.50 (d)

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD 3	£20 (d)
80T DS DD 2	£27 (d)

The number in green is the qualifying number for a free SWISS ARMY KNIFE while stocks last.

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	£12.50 (d)
3.5" Kit with 20 disposable discs	£14.00 (d)

DISC STORAGE BOXES

DB530 Non Lockable 30 x 5.25"	£6.00 (c)
DB340 Lockable 40 x 3.5"	£8.50 (c)
DB550 Lockable 50 x 5.25"	£9.50 (c)
DB570 Lockable 70 x 5.25"	£11.00 (c)
DB5100 Lockable 100 x 5.25"	£13.00 (c)

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	£179 (a)
Microvitec 1431AP As 1431 + composite video and sound input	£195 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£260 (a)
Microvitec 1441 High Resolution 895 pixels	£365 (a)

Microvitec 20" RGB/PAL/Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION III 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£325 (a)
MITSUBISHI XC1404 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	£229 (a)

MONOCHROME MONITORS

TAXAN KX1201G 12" Hi Res green etched screen	£90 (a)
TAXAN KX1202G 12" Hi Res Long Persistence (P39)	£98 (a)
TAXAN KX1203A 12" Hi Res amber etched screen	£98 (a)
PHILIPS BM 7502 12" Hi Res green screen	£75 (a)
PHILIPS BM7522 12" Hi Res amber screen	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£20 (c)
Philips Swivel Base	£14 (c)
Monitor Stand Models B & B+	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B+ or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	£37 (b)
ATPL Battery backup kit	£18 (b)
RAMROM 15 for Model B. External board in an attractive case — easy access to sockets. 6502 Processor signals for development work.	£79 (b)
Low Profile Cartridge Module Module + 1 cartridge	£12 (d)
Spare Cartridge	£2.50 (d)
Cartridge rack	£1.50 (d)

TIME WARP Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	£29 (d)

MODEMS

(All modems are BABT approved)
See page 7 for modem specifications

MIRACLE WS2000V21/23 & BELL stds	£79 (c)
WS2000 Auto Dial Card	£26 (d)
WS2000 Auto Answer Card	£26 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 DS1 disc	£10 (d)
WS2000 Data Cable for BBC	£6 (d)
MIRACLE WS4000 V21/23	£149 (b)
MIRACLE WS3000 V22	£495 (b)
MIRACLE WS3000 V22 bis	£650 (b)
BBC Data Cable for WS3000	£7 (d)
GEC DATACHAT Modem V23 1200/75 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. Special offer price	£69 (b)

PROGRAMMING ACCESSORIES/SOFTWARE

see page 8 for detailed specification
Compatible with B, B+ and Master

EPROMER II with disc based software and rom image	£99 (b)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 256K	£185 (b)
PORTAL EPROM EMULATOR 512K	£285 (b)
EPROM ERASERS UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B+ & MASTER (See page 6 for specification)

BASIC Version	£79 (d)
Tracker Ball/Mouse Version (TM)	£99 (d)
TM Version & Tracker Ball	£135 (c)
TM Version & Mouse	£125 (c)
Plotter Driver Generator	£28 (d)

MOUSE

AMX MOUSE WITH SUPER ART (pse specify B, B+ or Master)	£67 (d)
SUPER ART	£43 (d)
PAGEMAKER	£43 (d)
3D ZICON	£21 (d)
PAINTPOT	£21 (d)
DATABASE	£21 (d)

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RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master) — £59 (c)

RB2 Tracker Ball with Cursor Control Rom (for Master only) — £59 (c)

RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software) — £47 (c)

Cursor Control Rom for Master — £12.50 (d)

MIRRORSOFT FLEET STREET EDITOR incl VAT — £39.50 (d)

SOFTWARE
CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional — £310 (a)

ASHTON TATE's DBASE II — £310 (a)

SUPERCALC II — £195 (a)

SEND FOR DETAILS ON OUR FULL RANGE OF CP/M & PC DOS PACKAGES FOR BUSINESS, COMMUNICATIONS & HIGH LEVEL LANGUAGES

BBC SOFTWARE/ FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE
Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities.Max file size 4Mb — £37 (d)

STARdataBASE
A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW. — £49 (d)

MASTERFILE II
Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T) — £17 (d)

GEMINI's DATAGEM
A 24K database system offering large user defined record layout, multi level searches etc — £59 (c)

WORD PROCESSORS

VIEW 2.1 — £37 (d)

VIEW 3.0
New version of VIEW compatible with B+ complete with a printer driver generator. — £56 (c)

Hi-VIEW
Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text. — £36 (d)

VIEWSPELL
Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words. — £29 (d)

VIEW INDEX — £12 (d)

VIEW PRINTER DRIVER GENERATOR
A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper. — £9 (d)

DOT PRINT PLUS
Full details on page 5. NLQ rom for Epson Versions for FX/RX, MX and GLP — £28 (d)

WORDWISE — £24 (d)

WORDWISE PLUS — £38 (d)

INTERWORD
(If you own a WW+ then quote your reg number and pay £10 less). — £49 (d)

WORDEASE
A 16K rom based utility for WW+ — £24 (d)

SPELLCHECK III
A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc. — £31 (d)

EDWORD II — £43 (c)

SPREADSHEETS

VIEWSHEET
Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor. — £37 (d)

VIEWPLOT
A disc based plotting program. (To be released soon). — £22 (d)

INTERSHEET
The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc. — £39 (d)

INTERCHART
Graphics package for Intersheet — £27 (d)

ULTRACALC
BBC Publications very popular and well proven spreadsheet rom. — £49 (d)

QUICKCALC
A disc based economically priced spreadsheet package (40 or 80T Disc). — £14.50(d)

MINI OFFICE II
A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T) — £14.75(d)

LANGUAGES

META ASSEMBLER
Multi processor Assembler full details on page 8 — £145 (c)

ACORN 6502 DEVELOPMENT PACKAGE
A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor. — £43 (d)

MACROM
A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory. — £33 (d)

ACORN MICRO PROLOG
Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly. — £62 (d)

ISO-PASCAL
Acorn's full implementation of International Std Pascal on 2x16K roms. — £48 (c)

ISO PASCAL STAND ALONE GENERATOR — £30 (d)

OXFORD PASCAL
A fast P-code compiler and stand alone utility (40 or 80T) Network version available — £36 (d)

BCPL — £46 (c)

BCPL CALCULATIONS
Supports floating point, fixed point and fast integer calculations on BCPL — £17.50 (d)

BCPL STAND ALONE GENERATOR — £39 (d)

ACORN LOGO — £46 (c)

LOGOTRON LOGO — £56 (c)

BBC PUBLICATIONS OPEN LOGO — £55 (c)

ACORN LISP ROM — £39 (d)

ACORN FORTH ROM — £39 (d)

ACORN COMAL ROM — £43 (d)

MICROTEXT
A frame based authoring system from NPL for interactive computer tutoring. Disc based — £52 (c)

MICROTEXT PLUS
Extended Features incl extra memory, control of external devices etc. Rom based. — £229 (b)

COMMUNICATIONS

TERMULATOR
Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations. — £25 (d)

COMMSTAR
A highly popular communication rom suitable for all general purpose applications (specify BBC model) — £28 (d)

COMMUNICATOR
A full 80 col VT100 emulation program with easy to follow screen menus. — £49 (d)

DATABEEB
A variety of facilities for use with WS2000 Modem — £26 (d)

DS1 DISC
Special utilities for use with WS2000 — £10 (d)

UTILITIES

ACCELERATOR — £49 (d)

ACORN BASIC EDITOR — £22 (d)

BROM PLUS — £26.50 (d)

SLEUTH — £23 (d)

TOOLKIT PLUS — £31 (d)

EXMON II — £23 (d)

HELP II — £25 (d)

ACORN GXR GRAPHICS ROM specify B or B+ — £22 (d)

PRINTMASTER — £24 (d)

DUMPMASTER supports about 40 printers — £26 (d)

FONTWISE PLUS — £17 (d)

HERSHEY FONT CHARACTER GENERATOR — £18 (d)

ICON MASTER — £29 (d)

BILLBOARD — £18 (d)

STUDIO EIGHT — £19 (d)

MOVIE MAKER
Two Roms + Cassette — £26 (d)

CC SPEECH ROM — £28 (d)

CC SPEECH ROM to Text Rom — £34 (d)

ACORN SPEECH ROM — £15 (d)

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TS 400



PD 800



P2041 HT



PD 800 P

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users at competitive prices.

*All drives are fitted with MITSUBISHI's slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

*Mass storage 20 Mbyte drives are available in the following versions:

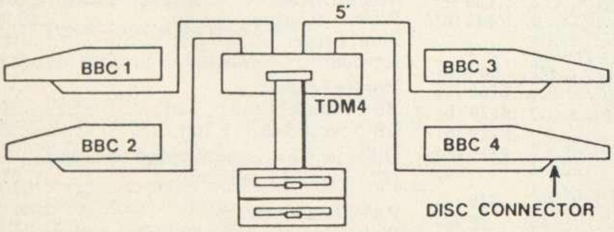
- P20HD Stand alone.
- P204HP With a single floppy housed in a plinth version case.
- P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

ALL TECHNOMATIC DRIVES CARRY A TWO YEAR WARRANTY AS STANDARD
(Effective 01.08.86)

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5′ of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)
TDM2 Dual Unit (2 computers)

SPECIAL OFFER
on
3M DISCS

FREE SWISS ARMY KNIFE
for purchasing requisite number of drives. Hurry, this is a limited offer.

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*A complete self-contained workstation.
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*8Mhz NS32016.
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***Phone for detailed leaflet.**

PHONE FOR DETAILS OF RANGE OF 32BIT SOFTWARE NOW AVAILABLE

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to your BBC.

* 6 Mhz. NS32016 CPU
* NS32081 Floating Point Processor.
* Bundled' languages including: Fortran-77, Pascal, C, Cambridge Lisp, 32016 Assembler, 32Bit BBC Basic.
* 1Mbyte RAM fitted as standard.
* **Phone for detailed leaflet.**

512 CO-PROCESSOR

Brings professional software to the BBC Master.

* 10 Mhz 80186 *DOS PLUS.
* GEM Write & GEM Draw.
* 'WIMP' Environment with high quality Mouse.
* Runs many 'IBM' programs — even 'Flight Simulator'!
* Convert to/from IBM/BBC data.

EPSON LQ800

Uses top quality 24 pin dot-matrix technology.

* Superb 'letter quality' at 67cps.
* Fast clear draft quality at 200cps.
* LQ/Draft modes selectable from front panel.
* Variety of fonts, usable in both draft & LQ modes.
* Optional 'personality' modules for Diablo and IBM emulation.
* Optional Font modules.
* Friction feed.
* Hi Res bit image graphics with hex density.

NEW STAR NL10	**£239 (a)**
NEW PANASONIC KX-P1080	**£169 (a)**

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

* Built-in character font generator.
* Built-in view printer driver.
* Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
* True bold print as well as double width.
* 12 character pitch as standard.
* Fully variable pitch and line spacing.
* Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
* **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
* **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their owners in the early days of the

NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their owners in the early days of the

GRAPHIC WORKSTATION

A Powerful A3 3 pen plotter with unique accessories.

* Resolution of 0.1mm.
* Opto-sensor allows digitising and scanning of pictures.
* A robust drill/router attachment allows drilling of light materials.
* Scriber allows fine-line drawing on coated materials.
* Basic plotter/accessories as well as supportung software is also available separately.
* Applications software available as an option allows interfacing of the drill/router with NOVACAD.

PLOTMATE

A4 LINEAR GRAPHICS 'PLOTMATE'
*Intercepts BBC Video Calls for direct outputs.
*Plugs into the BBC user-port.
*Runs with most BBC software.
*Supporting software available.

A4M/A3M LINEAR GRAPHICS 'PLOTMATE'
*Standard computer interfaces — suits most computers.
*Available in both A4 and A3 versions.
*Supporting software available.

EPSON HI-80

* Low cost while maintaining precision.
* A4 with 4 colour precision plotting.
* Variety of pens available.
* Ideal for overhead transparencies.
* Powerful software commands allow complex plots.
* Superb line/bar/pie charts simply produced.

HITACHI 672 PLOTTER

* A3 four colour precision plotter.
* Serial and parallel ports as standard.
* Produces 'OHP' transparencies as well as plain paper.
* 'HP' graphics language or single character commands.

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BBC & Misc:		SAA5050	**£9.00**
Keyboards	**£52**	6845SP	**£6.50**
Powers Supply	**£52**	UPD7002	**£5.00**
Keyswitch	**£1.75**	DS3691	**£3.50**
Video ULA	**£18**	7438	**£0.40**
Serial ULA	**£14**	74LSOO	**£0.24**
DNFS	**£18**	74LSO4	**£0.24**
UHF MOD	**£4.50**	74LS10	**£0.24**
6502A CPU	**£6.50**	74LS123	**£0.80**
65CO2 CPU	**£12**	74LS163	**£0.75**
6522 VIA	**£3.50**	74LS244	**£0.80**
6522A VIA	**£5.50**	74LS245	**£1.10**
LM324	**£0.45**	74LS373	**£0.90**
8271	**£46**	74LS393	**£1.00**
88LS120	**£3.00**	**BBC MASTER:**	
BBC PLUS:		1-Mbit ROM	**£39**
PAL16REN	**£13.50**	MSI CHROMA	
64K×4 DRAM	**£8.50**	IC	**£13.50**
6512A	**£12.50**	65SC12P-2	**£12.50**

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	**£28 (d)**
8148 + RS232 + 8K	**£75 (d)**
8165 IEEE + Cable	£65 (d)
8148 RS232 + 2K	£57 (d)
8132 Apple II	**£60 (d)**
8177P NLQ for FX80+/FX100+	**£99 (d)**

Parallel & Serial Buffers of various size also available.

FX80/80+/85 Tractor Attachment	**£37 (c)**
FX80/80+ Paper Roll Holder	**£17 (c)**
LX80 Tractor Feed	**£20 (c)**
LQ800 Tractor Feed	**£44 (b)**

SHEET FEEDERS:

8338 LX80	**£49 (b)**
8333 FX100+/105	**£169 (a)**
8331 FX80+/85	**£129 (b)**
8330 RX80+	**£129 (b)**
LQ800	**£129 (b)**

Ribbons:

RX/FX100/100+. FX105	**£10 (d)**
RX/FX80/80+, FX85	**£5 (d)**
LX80	**£4.50 (d)**
H180 Pen Set (Aqueous/Ball point)	**£7.50 (d)**

Dust Covers:

FX80	**£5.50 (d)**
TAXAN/Canon KP810	**£6 (d)**
FX100 **£7.50 (d)** **KP910**	**£7 (d)**

TAXAN CANON Accessories:

RS232 + 2K buffer	**£78 (d)**
Ribbon	**£6 (d)**

JUKI 6100

RS232 Interfaces	**£65 (d)**
Tractor Feed	**£129 (a)**
Ribbon (Carbon)	**£2.00 (d)**
Spare Daisy Wheel	**£14 (d)**
Sheet Feeder	**£182 (a)**

BROTHER HR15

Daisy Wheel	**£18 (d)**
Tractor Feed	**£90 (a)**
Ribbon (Carbon/Nylon)	**£3.00 (d)**
Sheet Feeder	**£182 (d)**
Keyboard	**£135 (a)**

Printer Leads:

BBC Parallel Lead (1.2m)	**£6 (d)**
BBC Serial Lead (1.2m)	**£6 (d)**

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	**£12 (d)**

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Plain Fanfold paper with micro perforations:

2000 sheets 9½″ × 11″	**£13 (b)**
2000 sheets 14½″ × 11″	**£18.50 (£4.50)**

Labels/1000:

Single Row 3½ × 1 7/16″	**£5.25 (d)**
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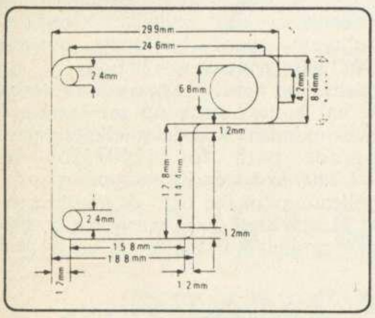
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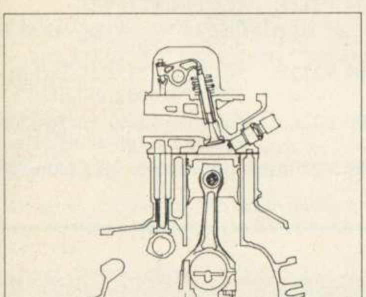
NOVACAD

Computer Aided Draughting for the BBC Micro

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

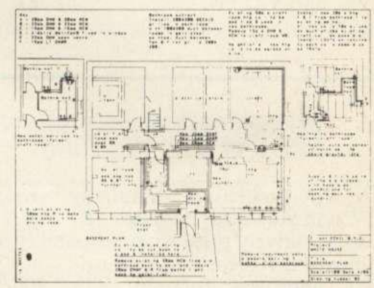
NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

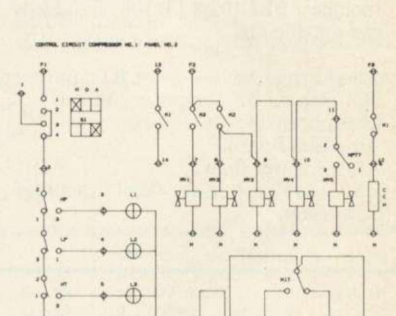


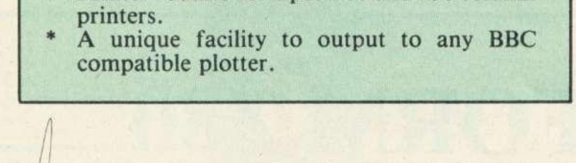


The major features of NOVACAD are:

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90 orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique facility to output to any BBC compatible plotter.







MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours with shadow memory, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will have additional user memory for more complex drawings.
6502 second processor will also increase the drawing speed.

NOVACAD is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard, Tracker Ball or a Mouse.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

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MODEMS

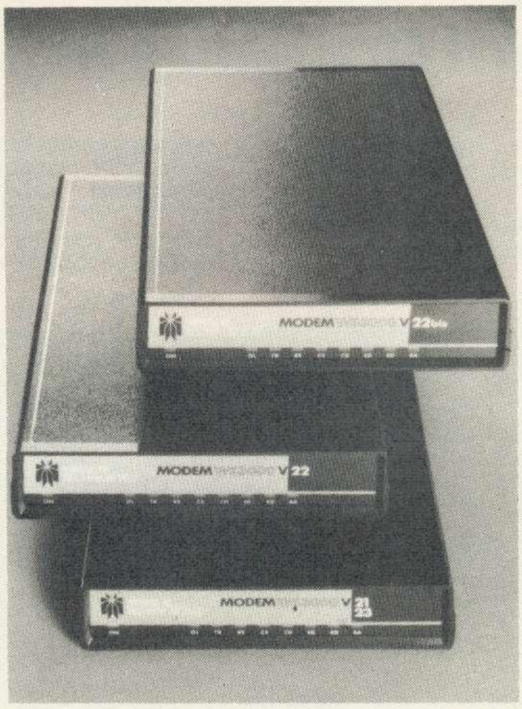
MIRACLE WS4000

* A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
* Plain English commands make it simple to use, even for the first time user.
* Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
* Equalisation model in V23 for line-noise filtering.
* Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

* A comprehensive manually switched 'World Standard' modem.
* Competitively price with a capability to be upgraded for various options.
* BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
* Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).
* SK1 chip set for computer control.
* User port cable.
* Auto dial Board.
* Auto Answer Board.
* DS1 disc for auto dial facilities on Commstar.



WS 3000 Range

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.

MIRACLE WS3000 RANGE

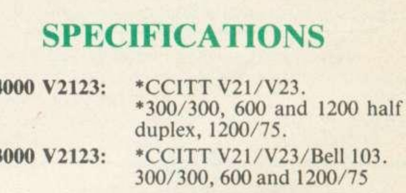
* A professional range of intelligent modems with full BABT approval.
* Auto Answer and Auto Dial facilities installed as standard.
* HAYES protocols implemented.
* Pulse or DTMF 'tone' dialing.
* Plain English command structure simplifies the use of the modem.
* Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
* A line sharing facility to differential between data and voice calls.
* Intelligent speed buffering converts 1200/1200 terminals to 1200/75
* Equalisation mode for line noise filtering.
* Internal battery back up for storing 63 names, numbers and default settings.
* Upgrade path for 1200/1200 and 2400/2400 and security encryption.
* Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.



* It is capable of running most CP/M 2.2 format applications programs on the BBC.
* Connects to the BBC via 1MHz bus, no restriction on the cable length. OS/M operating system on rom.
* Integral mains psu and 64K on board ram.
* 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
* Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
* Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
* Multiform is fully compatible with Acorn's 8271 and 1770 DFS on models B, B plus and the Master.
* Single density dfs allows single density CP/M format use. Double density dfs allows both single and double density CP/M formats to be used.
* Single or dual, single sided or double sided and 40 or 80 track drives can be used provided that they match the CP/M software format to be run.
* Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
* Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
* Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

BBC Computer & Econet Referral Centre

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EPROMER II

Eprom Programmer for the BBC Micro Series



Epromer is supplied with a integral mains psu, all the necessary cables, a manual and software on disc. Disc also contains the rom image for use with sideways ram. Rom based software is available as an optional extra if required.
Epromer is fully compatible with Acorn DFS on the BBC B, B+ and the MASTER.

* A sophisticated Eprom Programmer that uses the latest Eprom Programming technology to simplify the use of the programmer and at the same time allowing the programmer the full control of the programming process.
* It handles the full range of popular single rail Eproms up to 28256, all except the 27256 are programmed in a single pass.
* Powerful menu driven software makes the programming of eproms simple and efficient.
* Selectable programming voltage 25/21/12.5V.
* Two programming option, standard and algorithmic for eproms capable of high speed programming. 27128 can be programmed in just over 2 mins.
* Single address to full eprom address selectable for any of the epromer function ie blank check/read/burn/verify.
* Full screen editor with input in hex or ASCII.
* Software interface for special programming requirements eg programming alternate bytes etc.
* Many other useful utilities included.

Please send for full specification sheet.

META VERSION THREE

The only package available in the micro market that will assemble 27 different processors at the price offered.

Now Available

* **Assembly for even more processors**
* **Now over 70k long on 2 16K Roms and 2 Discs**
* **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It is supplied on two 16K roms and two discs and it is fully compatible with all BBC models including Master and gives you complete Editing and Assembly facilities for all the listed processors:

1802	6800	8085	6305
HD 64180	6802	Z8	6801
Z80	68HC11	68120	6803
6502 (including *all*	68000	68121	6805
CMOS varients)	8048 Series	6808	6804
65C812	8051 Series	6301	6809
65C816	8080	6303	

META uses the appropriate standard mnemonics for each, eg. LD (HL), 0ABH in Z80 and MOVE. B DO, $50 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MUL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your detailed spec sheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon.

Please specify the computer type when ordering.

PORTAL EMULATOR

* Provides real time emulation of all listed eproms at 150 ns.
* Totally software driven by (META).
* Compatible with 'piggyback' processors.
* Upto 4 portals can be used on the same BBC lead.
* Each PORTAL has a lead terminated with a 28 pin header to plug into the socket you need to emulate.
* Various options available for sending code: eg use two PORTALS for 16 bit data bus with sequential PORTAL skipping.

PORTAL is available in two versions:

PORTAL 128 for 2716, 2732, 2764, 27128.

PORTAL 512 for all of the ones listed above + 27256 and 27512.

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LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

ELECTRON USER GROUP

Sir, I am starting a user group for Electron owners, and would be grateful if you could publish my full address so that potential members can contact me.

While based in Cheshire, I would welcome enquiries from anywhere, as the group will be postal. There are no fees, the idea being to encourage contact and help between members. It will probably produce a cheap but informative newsletter to which members will contribute.

Finally, could I ask that enquirers enclose a stamped addressed envelope for a reply. Thank you in anticipation.

Michael O'Donnell
5 Worthington Close
Runcorn, Cheshire WA7 2QG

KNOCKED SIDEWAYS

Sir, Add my opinion to those which say that too high a level of pre-knowledge is assumed by too many authors of articles and manuals.

The advertisement for a well known 32k shadow RAM board says: 'Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs.'

That's clear enough, you say. Yes, but the manual is completely incomprehensible except to a person with a good working knowledge of the operating system of the Beeb. I can't understand for instance if the above refers to *any* program, or only user written ones.

The July issue of *AU* itself is at fault! The article Helping Hand says near the end: '... or perhaps to place the Help file and its routines in sideways RAM. The reader should have enough information to tackle these problems and extend HELP as much as he or she desires.' Indeed!

This in spite of the often expressed editorial opinion that there is not enough help for users of sideways RAM. The article in the March issue on 'reading' and 'writing' bits (or bytes?) to swRAM is useless to me; and in spite of a promise that a future issue would contain aids to enable complete Basic programs and routines to be stored to and accessed direct from swRAM, nothing has appeared.

I suggest that all articles are first read by a non-technical person and those assuming a high level of pre-knowledge be returned to the author for re-writing. Don't be afraid that you will lose readers by teaching Granny to suck eggs. The technically expert can skip what are to them irrelevances.

After all I still buy it, and I have been skipping large chunks of technicalities in every issue.

Brian E Battersby
Oldham

PUTTING THE BRAKE ON BREAK

Sir, Bruce Smith in his Master Review (*AU*, March) refers to 'hecklers who bemoan' the lack of a facility to disable the Break key on the old BBCs. May I add my name to that list of hecklers. When using my BBC B for word processing with *View* I quite often hit the Break key in error as it is next to 'Delete Character' (f9). Though text can be recovered by typing OLD, if I am using EDIT some material is usually lost. Besides it is an infernal nuisance to have to go through the recovery process.

He writes 'if they knew anything about programming they would know that the software key to do this has always been there'. I do not know anything about programming but would nevertheless be very grateful to know how to disable the Break key. Please could you explain the routine.

Dale Serjeantson
Barnes, London

The normal action of the Break key can be prevented by intercepting the Break intercept vector with *FX247, *FX248 and *FX249. The techniques for using these were discussed in the July 1985 issue (page 145) by Mark Dove.

***View 3* has adequate Break protection; in *View 2.1*, typing OLD will restore any text 'lost' by accidental pressing of the Break key. The screen mode can be preserved after a Break by means of *FX255,3,248, or – more permanently – by making the mode selection link on the keyboard. To select mode 3, switch numbers 7 and 8 (on the right or at the top) must be linked.**

An even simpler technique is to make a small Break key guard out of cardboard.

TROUBLE WITH COMPATIBILITY

Sir, I agree with Mr L. Cool of London (Letters, July) about incompatibility of standard BBC B software. As a Beeb B+ 128k owner and a regular *AU* and *MU* reader, I would have thought that the software houses would have said something about it but alas not, it seems. People like me who don't have much money to spend must get the feeling that they are being ripped off.

Is there anything I can do to get the software to run? I send back the software to the software houses and they send it back saying it's OK on a standard Beeb but they can't try it on a B+ 128k. All the software loads OK but then it either does not run or the graphics are mixed up. Surely there must be a way of altering the OS or a program patch that will emulate a standard Beeb? If not, can you explain the incompatibility between the standard Beeb and the B+ 128k?

The software below seems OK on a 128k:
Frankenstein 2000 (Icon)
Chuckie Egg (A&F)
Tempest (Superior)
Cylon Attack (A&F)
Repton 2 (Superior)
Zorakk the Conqueror (Icon)
The Genesis Project (ASL)
Drain Mania (ASL)
Bug Eyes 2 (ASL)
Megasports (ASL)

The following software does not run on a 128k: *Flip* (ASL), *3D Grand Prix* (S Invasion), *Caveman Capers* (ASL), *Space Agent Zelda* (ASL), *Chrysalis* (ASL).

S M Adams
Malpas, Cheshire

QUICK-SCORING MATCH PLAYER

Sir, Great magazine! I've been receiving it since the third issue and it has improved greatly. I find the articles covering products particularly useful.

I enclose my reader survey sheet and I would also like to offer you my best scores on my favourite games. I have played the computer at *Match Day* and beaten it 14-0. This score came after many hours of discovering the quickest scoring technique, which is to run straight down the right wing then shoot diagonally into the goal.

Also, I notice you publish no high score for *Commando*, so I would like to offer my score of 123,600 which is improving almost every day.

K Blatcher
Westcliff-on-Sea, Essex

LETTERS

CLOWNING AROUND

Sir, Michael Lloyd (Letters, July) asks for help with *Circus*. I suggest you type in exactly what it asks you for. Where you need to make a decision (like going north, south, etc) I suggest you move in the first one or two games nearly randomly, making a map as you go. After you make a map of all the outside locations, head for the car, open the boot and get everything in sight. Move back to the tent and map that as well. Then start to play seriously and complete the game.

A few clues? For a start, the clown wants you to dress up for the occasion. It isn't the bucket that needs kicking. Maybe the sea-lion is hungry. Vandalism is all part of this game, so take it out on the door if you don't like it!

Plain talk? No-one should need to use plain talk. If you are going to read those instruction manuals of yours you are going to have to put up with jargon. And there is no way you can get round that. If you are going to even start to program a computer you have got to have some idea as to the differences between a byte, a bit and a nybble.

Jonathan Day
Stockport, Cheshire

DUMP FOR A COPAL

Sir, Recently I got a Copal SC-1000 dot matrix printer from Cambridge Computer Centre and I am very pleased with its performance in wordprocessing. However, I am a bit disappointed that it's not Epson-compatible as far as screen dumps go.

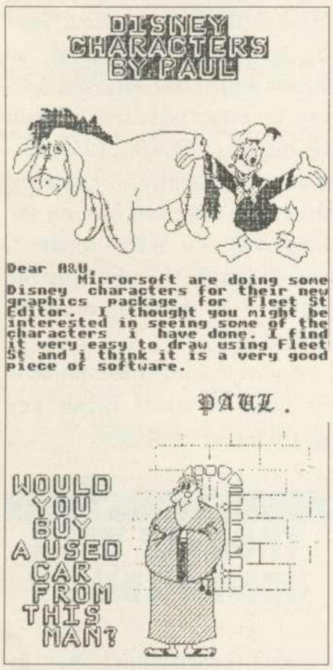
So far I have not managed to write a working dump, and I was wondering if there is anyone out there who owns a Copal SC-1000 or 1200 who has a screen dump which will work with these printers. I'm tearing my hair out because I can't (as yet) use my printer with AMX *Super Art*, or any of the excellent graphics programs featured in your magazine.

Also, is it possible to change a printer's controlling firmware, perhaps to an Epson one? If this is possible it would solve all my problems.

I am a regular reader so perhaps if anyone can help me, they could contact *Acorn User*, or write in to the letters page.

Anyway, congratulations on a truly excellent, much improved and much worth the extra few pence, magazine.

Tom Oswald
Cambridge



ELK OWNER DEMANDS MORE

Sir, After owning an Electron for six months, and reading your publication for five, I must complain about your lack of articles for this very popular machine. You could at least provide a part of the magazine for Electron owners to converse together and discuss matters which do not concern the Beeb or the Atom.

The Electron is a much-praised machine and most of the major software companies now support it. Electron owners are always comparing their machine to a Beeb – but that is like comparing a ZX81 to an Amstrad CPC464.

As for *Acorn User*, if your magazine ever lowered its standards or drastically changed its format, I would have to go back to another magazine which is currently not half as good as yours. The best part of *AU* must be the Abuser's Diary – more please!

Mark Richards
Brixham
Devon

Our policy is to get Electron (and Master) owners to build on the techniques developed on the BBC and the Atom. All these machines have a common heritage and that should not be lightly thrown away. The Acorn Forum is there to pull machines together, not pull them apart. And it's easy to see at a glance from the Yellow Pages index what will work on the Electron. As we've said in the past, we rely on *you* for articles – so send them in.

MEET US HALFWAY, GUYS

Sir, I have long since resigned myself to the phenomenon of ROM clashes, but must admit surprise when I found that *Mini Office II*'s spreadsheet software would not run with *Pagemaker* ROMs on board. Naive perhaps, but nobody's perfect.

It would appear that the spreadsheet executes a star command which is in the *Pagemaker* support ROM and, bingo, the machine goes belly up.

Easy, you might say. Just turn off the offending ROM. Locations &2A1 to &2AF contain the active ROMs so just set the chosen one to zero and the ROM goes away until the next soft Break. You can type *HELP to see if it is still there and if it has not disappeared hit Break and then try another location, eg ?&2AB=0.

The implications, however, lead me to wonder just what the software manufacturers are trying to prove. Think of it this way: *Mini Office II* is an excellent piece of software and its spreadsheet is fast and versatile. From the spreadsheet some super graphics can be produced, eg pie-charts, which can then be saved to disc. Using *Pagemaker* these screen images, together with *Mini Office II* wordprocessing text, can be incorporated into an A4 size document to make a very effective report. Wonderful, but for the ROM clash.

On the basis that you are probably not going to be continually moving ROMs around inside the Beeb, natural logic says why not put the ROM disable commands in the !BOOT file? Foiled again! *Mini Office II* seems to have its own disc I/O routines and, although the disc can be catalogued, the !BOOT file cannot be accessed, read or written using standard DFS commands. OK, so it is possible to set up another disc with an initialise routine and a prompt to load the appropriate system disc, but what a pain.

To add insult to injury, both *Mini Office II* and *Pagemaker* boast the ability to use the AMX mouse. You would have thought that the suppliers, Database Publications and Advanced Memory Systems, would have talked to each other about it. Their credibility as serious business people just took a nosedive in my perception.

So I am left to join the expanding ranks of frustrated users by saying to the software publishers, we don't expect 100 per cent software tolerance but meet us halfway, guys! Protect your software by all means but give us a little flexibility to enable us to tailor the start-up files to fit our configurations.

Eric Warmington
Camberley, Surrey

LETTERS

MICRO SPORTS AID

Sir, As the man behind my successful sporting wife (and PE teacher) I often find myself organising sports clubs and the appropriate ladders/leagues/tournaments, etc.

Do any of your readers know of a software package (commercial or otherwise) that would assist me? I already have word-processing and spreadsheet facilities but I am looking for something more specialised.

P M O'Brien
BFPO 57

NEVER MIND THE HEAT . . .

Sir, If you live in the tropics the problem with computers and disc drives is not so much the heat as the humidity. I reckon that we lost 20-odd discs last week as a result of very high humidity.

What happens is that the discs oxidise and when you use them they deposit a nasty goo on the drive head. This sets like rock and does nasty things to the discs. Proprietary head cleaners turn this goo into an even harder rock.

The answer is to clean the drive heads frequently with a matchstick. I know the manufacturers will shudder but our engineer does this to 50 IBMs regularly and it works.

So far as dics are concerned, unless you have a de-humidifier, keep them in a box with a 15-watt bulb lit all the time.

D W Greenwood
Suva, Fiji

MORE ROMS ON DISC

Sir, Since people seem to be writing to complain about the lack of software making use of extra memory/sideways RAM, how about a list of what is available?

To start it off, here is my contribution of what will run in sideways RAM on the B+ 128k:

- *Speech!* (Superior Software)
- Utility RAM (CCD Computer Services, Winslade Barton, Clyst St Mary, Exeter EX5 1AT). Gives teletext adaptor software.
- Morley teletext adaptor software.

No doubt software houses are scared of piracy but I for one would rather pay the same price for ROM images on disc as they can then be pumped in as required without opening up the machine. Also you do not have to unplug or disable a ROM that clashes.

I wish CCD, Morley and Superior well and hope that other software houses take note. There are quite a few ROMS that I would buy if they were available on disc.

Paul F Tolson
Dewsbury, W. Yorks

INTER VIEWS

Sir, May I please set the record straight regarding our Inter series ROMs. On several occasions in the last few months, including page 29 August issue, a totally misleading non-fact has been stated.

The Inter series ROMs *do not* require a dedicated ROM in order to pass data between them. The large number of people quoting this from your magazine shows how every piece of information is carefully gleaned and remembered! Unfortunate when mistakes creep in, though.

Inter-Sheet is 32k long, split into two ROMs. We assume that if someone only has room for one of the ROMs, they probably haven't got a ROM expansion board and therefore won't have other Inter series ROMs plugged in. In this case, commands to transfer data would be useless. By this reasoning, *Inter-Sheet* is split so that all the main spreadsheet functions are in one ROM and all those concerned with data transfer are in the other. Thus, when short of space, the '*Sheet*' chip is plugged in alone, offering all features except data transfer. On the other hand, *Inter-Chart* is one chip containing its own data transfer commands. So too is *Inter-Word* and so too will be *Inter-Base*. There is no 'extra' chip for data transfer.

Whoever first wrote it, take 100 lines: 'I promise to check things before I write them.'

Rob Pickering
Computer Concepts
Hemel Hempstead
Herts

FRUSTRATED DESIGNER

Sir, Congratulations on your very interesting insight into the workings of *Elite* in the January and February issues, and the superb Commander File Editor. I have now completed both missions. (The first three times I failed the first mission because I never managed to find the constrictor. I rectified this by changing my mission control back to zero so I was set the mission again – and found the constrictor immediately.)

In the January issue, you mention briefly the D. information files but then dismiss them by saying that the commander files are 'far more interesting'. I would very much like to be able to edit the D. files in order to design my own set of spacecraft. This would be of great use to all players of *Elite*, as an inexperienced player could design ships with a low maximum speed and manoeuvrability, and also weak shields, whilst an experienced player could design a host of formidable opponents to tax his or her skills to the limit. Or maybe we could just have a few hints on how to interpret the data in the files. I have tried comparing various D. files and, although I have found some similarities, I have come no closer to understanding how to change the data meaningfully.

I have also turned my attention to *Revs 4 Tracks* in an attempt to design new tracks, but whenever I make the slightest change to the files, the machine does a reset as soon as it has loaded. Could you help me on this one too? I would be very grateful if you could answer these questions, because it would greatly enhance my, and no doubt many others', enjoyment of these games.

Finally, here is a useful one-liner to perform a memory dump. It prints unprintable codes as the teletext block character (255). All leading zeros are printed. The start address can be entered in hex preceded by the & sign or in decimal.

```
*KEY0 I. "Start: "B$:B% = EV.
(B$) :CL.:DIMA (8)
:REP.:P.;~B%;:F.C% = 1TO8:A
(C%) = ?B%:V.32,–48*
(LENSTR$~ A (C%) = 1)
:P.;~A (C%) ;:B% = B% + 1
:N.:V.32:F.C% = 1TO8:V.
(A(C%) > 126) OR (A(C%) < 32)
ORA (C%) :N.:P.:U. FA.|M
```

I M Goldby
Dangerous (without cheating)
Broxbourne, Herts

BRIDGING THE GAP

Sir, I have been scanning the pages of *Acorn User* for months in search of any programs which play Bridge.

Surely, when the BBC micro plays a good game of chess or simulates a jet or racing car it must be possible to devise a program which will play Bridge and provide invaluable training to the thousands of devotees throughout the country?

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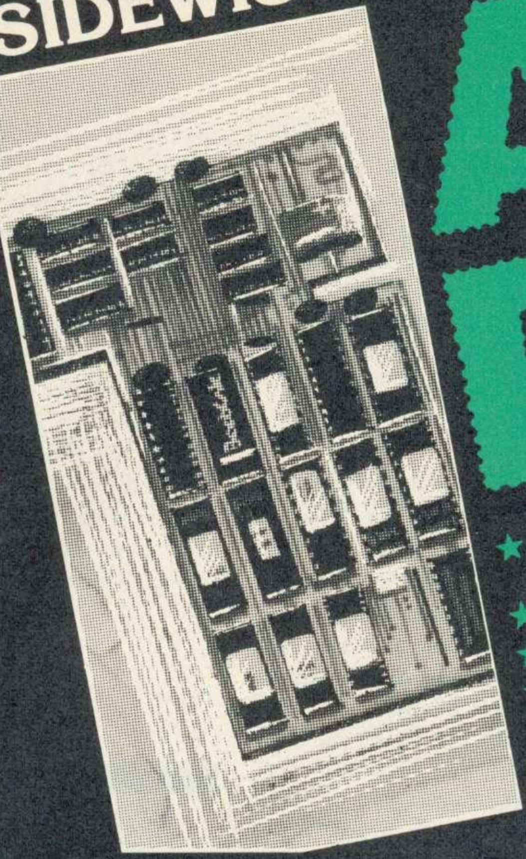
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In addition to all the facilities already listed, the BEEBAID Rom is supplied with a Disk File Indexing system. This system automatically maintains an index of all your software and allows you to categorise your programs, eg. Games, Educational, Simulation etc. It can be dynamically tailored to your own requirements, eg. your disk drive configuration and which directories you want to index. The Index may be searched by program name, disk number or category. It is supplied on a 40/80 compatible disk with its own bound manual and it is FREE!

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To order your copy of BEEBAID, simply fill in the cutout and send it with a cheque or postal order payable to:
JAYSOFT at: For technical enquiries please call 01-462 8453 (7-9pm)
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LETTERS

MASTERING MANUALS

Sir, Having recently purchased a Master 128 I must say how pleased I was with it. Having upgraded from a Spectrum 48k I was most impressed with the sound, colour, etc. But looking through the adverts in the June edition, I could not find any mention of software for the Master series. Does all the BBC B software work on the Master if I switch to DFS and use the Convert program on the utilities disc? Or will I have to make do with the game on the welcome disc for the rest of the computer's natural life?

Another gripe is the amount of information put into the welcome guide (or rather, not put in there). Just when it looks that it's saying something of great interest, it instead coins the cliché: 'But that is beyond the scope of this guide.' The extremities of this were when introducing *View*, *Viewsheet* and *Editor*. Apparently all the mysteries of the universe (or at least the Beeb Master) are contained in the Reference Manuals, approx £15.00 each. After taking delivery of these two manuals I must say how pleased I was with the information content, even though I found them pretty heavy going at first. The Master seems so much more advanced than the BBC B computer (according to the manuals) but will I ever get to see all the amazing things it can do, in the way of graphics, etc, if I can't get any software for them?

Anyway, all moaning done with, I must congratulate Acorn for a brilliant computer.

David Stevens
Penzance
Cornwall

VERSE AND WORSE

Sir, Help is now at hand for those still wandering about in *Twin Kingdom Valley*. I have just burst into rhyme to help you.

To get the Bronze Key you must give
The witch an extra eye;
A Palantir – don't try to fight,
Or you will likely die.

Out of the maze you'll find a dungeon
Dank and cold and grim.
You'll see a guard – a kingly gift
You have to give to him.

Your gift accepted, find yourself
In audience with a king.
His champion you will receive
A periapt, this thing.

Another thing you must acquire
A precious silver key
You'll never have. Your quest fails if
You see the Princess flee.

To catch her eye she must be shown
That unto her king you are known.
Then if you venture back to court,
You will obtain your just reward.

Two ways to cause a dragon's end:
One is to have a large strong friend!
The other is a staff of power
Locked within a nearby tower.

So you now dragon slayer be
And in your hand the Master key.
Use it to open every door
To find what you are looking for.

And once you have a treasure chest
Your answer lieth due south-west.
Near waters meet you'll pass the test
And find that which is truly best.

Bronze, Silver, Gold and Master keys,
You should by now have all of these.
Hard-won bags of silver, gold
And other treasures now be told.
A bucket filled up to the brim,
A chest of gold there at your feet.
You find you have 1k of points –
And yet your task is incomplete!

All of these treasures you will need
If your great quest is to succeed.
Now look on that which lies nearby.
That's all, well done, stay cool – Goodbye!

If you are still stuck, phone 01-539 7039 between 8pm and 9pm weekdays and ask for Steve or Mark.

Stephen Murgan
Leystonstone, London

PRESERVING WORKSPACE

Sir, Re your reply to Clive Brown's letter in July's *Acorn User*, here is a reader about to prove you wrong (as you anticipated!) on the question of a sideways RAM resident disc workspace which would leave PAGE at &0E00.

I have been using MRM Software's E00 DFS for over a year now, and have found it to be very good. It is a small circuit board which plugs into a ROM socket, and contains a DFS Eprom, a 4k RAM chip and a small decoder IC. A lead is connected from the board to the R/W line on the 8271 using a spring clip. It works happily in the basic BBC B or one fitted with a ROM board *which will accept sideways RAM*, but does not prevent the fitting of such RAM.

The DFS RAM is not corrupted by writes to &8000-&BFFF as it is only enabled when the DFS ROM is selected.

As its name suggests, the DFS leaves PAGE at &0E00; it appears to be functionally identical to Acorn DFS 1.20, and it will run *Elite, Dune Rider, Doctor Who, Hyper Sports, Powerplay*, etc, etc. Unfortunately, it will not run *Revs* but will run it if the *4 Tracks* disc is used first! It also works happily with most disc utilities requiring DFS 0.9 or DNFS (DFS 1.20).

I cannot see why a similar idea could not be implemented for the ADFS; the only change would have to be an 8k RAM chip on the board instead of a 4k; this would however map the DFS ROM into &8000-&9FFF and the RAM into &A000-&BFFF, like a 16k Eprom.

Unfortunately, MRM are no longer trading, so it is now up to some enterprising company to produce and market a similar device for the ADFS. Are there any takers out there?

Mike Tomlinson
Wallasey
Merseyside

WHERE ARE ALL THE MASTERS?

Sir, Have Acorn really gone out of business? Are the reports of the Master series just rumours to prevent BBC fans rioting?

I live in the Grimsby area, and I regularly visit the local computer stores. I have yet to see a Master. I have yet to see a BBC B+. In fact, apart from a few Electrons that Dixons and Boots were selling off cheaply, I have not seen an Acorn computer in the shops since before Christmas 1985.

I realise I live in a fairly rural area north of Watford, but civilisation did eventually reach here. I know there is mail order. It would be nice to see before buying, and one hears such horror stories. However, I do use mail order a lot but I wonder for how much longer... And for how much longer will I be able to buy my favourite specialist BBC magazines?

Seriously though, it is my opinion that, if Acorn do not organise their *national* marketing the way Amstrad/Sinclair seem to do, they stand to lose a lot of business.

Keith M Newborough
North Thoresby
Grimsby

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48-9

LETTERS

WITH A LITTLE HELP...

Sir, Being a semi-advanced user, who sometimes forgets codes, etc, I was very interested in the Get By With A Little Help article in your July issue. I typed the (rather long) programs in, and entered my help information. However, when I came to delete an entry, I used a disc sector editor as suggested, but found that the formatting of the list printed by *H<RETURN> was wrong. I realised that this was because the routine was printing an extra two spaces around the 'null' entry. The way to cure this is not to use eight nulls, but to use six nulls and two delete characters (ASCII 127 or &7F). This deletes the two extra spaces, and keeps the columns straight. Otherwise the program is excellent.

I have two complaints to make about your magazine; the high score table has had the note 'Please say whether your score was notched up on a BBC micro or Electron... because in future issues we'll be publishing separate tables for each micro' since September '85 (how long can we wait!). And you don't publish enough Basic Checksums, which are useful even in assembler, as they pinpoint the line exactly.

Apart from that, I find the magazine great value for money.

Misha Dorman
Rode, Bath

SHOPPING BY POST

Sir, I read with interest the letter from Maurice Gordon in the July edition of *Acorn User*, and note his sorry experience with mail order firms. I feel that I must comment on behalf of those who have received excellent service from such firms. Although resident in Saudi Arabia, I have had no difficulties in obtaining both software and hardware from firms in the UK, and in particular must commend Watford for their very prompt replies to all my letters. What minor delays I have experienced have been due to the post, as surface mail takes about three months to reach me from the UK, but in most cases this has been avoided by the use of airmail. I have had clear, intelligent replies to all but one of my postal queries, in dealings with a range of suppliers, and in the one instance where software was advertised before completely ready, I was offered an immediate refund if required, and the cheque was not banked until the package was dispatched.

While I sympathise with Mr Gordon's understandable frustration with dealings from afar, I must say that my experiences have been most satisfactory, and much prefer shopping via the pages of *AU* to that of walking the streets of Bristol, returning home empty-handed yet again. There are always two sides to a story – I would like to think my experiences are in the majority, and I for one will certainly continue to use mail order.

I must finally thank you for a most interesting magazine. It's a welcome read every month out here and, together with my Beeb, gives great pleasure in off-duty moments.

Michael Beattie
Riyadh, Saudi Arabia

UNIVERSITY CHALLENGE

Sir, I have owned a BBC B for almost two years and in those two years I have been a faithful reader of your magazine. I work at the Brussels Free University and do research in the area of computer graphics. With the programs published in your magazine I was able to make some drawings that approached some I made on a Macintosh.

Since the main field of my research lies in the study of fractals I was glad to find some related articles and programs in your magazine. I have converted the program of your October '85 issue to run on a laser printer and enclosed is a result of that conversion.

I also modified your last program on fractals (May '86) so that it would run with the 16 colours mentioned in the article but without the use of a Graphics Extension ROM. The trick is to modify the byte stored at &359. This byte is used by the processor to store the current foreground drawing colour. Since a colour in mode 2 only needs four bits, two colours can be stored in this byte. If you store two different colours in this byte, then generate a draw command, the line will be drawn in mixed pixels of the two colours.

```
 10 REM Mandel 1
 20 REM by Dirk De Wolf
 30 REM for BBC B/B+/M/E
 40 REM (c) Acorn User September 1986
 50 :
 60 maxcol%=15
 70 MODE 2
 80 S%=255
 90 DIM C%(S%),co%(maxcol%,1)
100 FOR I%=0 TO maxcol%
110 READ co%(I%,0),co%(I%,1)
120 NEXT
130 DATA 0,0,&11,&22,&33,&33,&32,&31
140 DATA &30,&30,&34,&38,&3C,&3C,&2C
150 DATA &1C,&0C,&0C,&0D,&0E,&0F,&0F
160 DATA &0B,&07,&03,&03,&17,&2B,&3F
170 DATA &3F,&2A,&15
180 VDU 28,16,31,19,0
190 INPUT"x,y:"j,k
200 INPUT"  s:"q
210 var=maxcol%/LOG(S%)
220 FOR N%=1 TO S%
230 C%(N%)=maxcol%-INT(LOG(N%)*var)
240 NEXT
250 Q%=1024:M%=1
260 REPEAT
270 L=q/M%
280 H%=Q%/M%
290 FOR J%=0 TO M%-1
300 FOR K%=0 TO M%-1
310 IF K% MOD 2 OR J% MOD 2 PROCpt
320 NEXT,
330 M%=M%*2
340 PRINT M%
350 UNTIL M%=256
360 PRINT"END"
370 END
380 :
390 DEF FNm(u,v)
400 N%=-1:x=0:y=0
410 REPEAT
420 y2=y*y
430 x2=x*x
440 y=2*x*y+v
450 x=x2-y2+u
460 N%=N%+1
470 UNTIL N%=S% OR x2+y2>=4
480 =N%
490 :
500 DEFPROCpt
510 x=j+L*J%
520 y=k+L*K%
530 X%=J%*H%
540 Y%=K%*H%
550 dummy%=FNm(x,y)
560 I%=0
570 FOR i2%=Y% TO Y%+H%-1 STEP 4
580 ?&359=co%(C%(dummy%),I%)
590 MOVE X%,i2%
600 DRAW X%+H%-1,i2%
610 IF I%=0 THEN I%=1 ELSE I%=0
620 NEXT
630 ENDPROC
```

Fractals for a laser printer

Dirk De Wolf
Aalst
Belgium

WE DON'T MAKE THE RULES

Sir, I am appalled by your blatant display of dual standards.

On one hand you refuse to publish the free ads that mention swapping or selling software. Surely, once purchased, *any* item can be resold or exchanged as second-hand. On the other hand, you publish ads for a Demon modem that is not only 'non-approved' but actually carries a 'prohibited' label. The offer also includes 'free' registration to Microlink. This advert incites people to break the law and risk prosecution.

Acorn User obviously condones the flaunting of the laws relating to equipment being connected to British Telecom lines, and yet will not allow the sale of genuine, though second-hand, software through your pages.

Anthony Howard Jorth
Shipley
Yorks

You are right in saying that items can be resold, but that is not the reason for our ban on swapping software through the free ads page. It came about because ads were being used to swap or sell *copies* of software, which is illegal.

The rules on telecommunications hardware are complex, but the companies you cite were complying with the law, which states that advertisements must say whether the apparatus is approved or not for connection to the BT system. It is legal to advertise 'prohibited' products. It is legal to buy them. It is not legal to connect them to the phone system. This is an example of the law passing the responsibility down the line to the end user.

It might seem a strange system, and it is one which *Acorn User* did not invent, but which we must comply with.

HINTS & TIPS

Martin Phillips continues his review of standard printer codes and explains how screen dumps are programmed

DOWN IN THE DUMPS

To judge from the letters we receive, printers cause more distress and confusion than almost all other problems put together. Many readers have asked for help with screen dumps, so this month I shall show how screen dumps are programmed on dot matrix printers and how they work. Understanding how screen dumps work requires a knowledge of printer commands, as well as a knowledge of how screen images are stored by the computer.

First, what is a screen dump? It's a program that will copy an image of a picture from the screen and dump it to a printer. Usually the foreground colours are printed in black, but it is possible to show each colour as a shade of grey – a tone dump. These are even more complicated than normal screen dumps and, as several have been presented in *Acorn User*, they will not be covered here (see references).

Screen dumps usually work in modes 0-6. Mode 7 screen dumps are possible but work in a totally different way and are outside the scope of this article (see references). A picture screen dump is different from text printing because normally the particular letters, numbers or punctuation marks are each sent as a single code number, which the printer then converts back into the required symbol. The codes follow the ASCII standards. (ASCII stands for American Standard Code for Information Interchange.) They are a standard set of code numbers which relate the various symbols on the keyboard – letters, punctuation marks and numbers – to numbers.

ASCII codes are normally in the range 0 to 255. The ASCII codes from 0 to 31 control the printer's actions, codes from 32 to 127 are used for the letters, numbers and other symbols. Usually codes in the range 128-255 are not used. The VDU summaries in the *User Guides* list the VDU codes in the range 0-31 and 127, and give the ASCII abbreviations. The rest of the ASCII codes can also be found in the *User Guides,* where there are charts showing the ASCII (modes 0-6) displayed character set. The use of these codes explains some peculiarities of the keyboard.

BBC and Master owners will be aware that some keyboard symbols appear differently on the screen in mode 7. The reason is that the

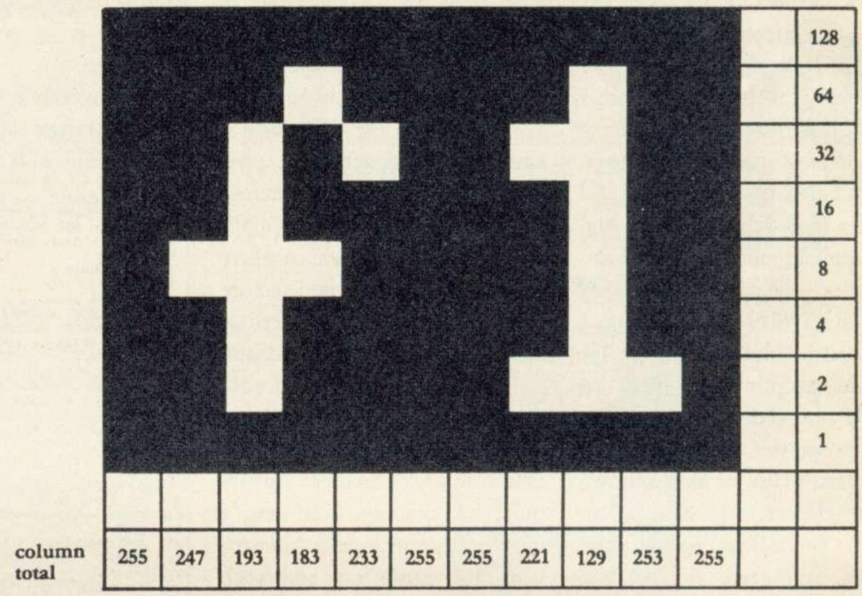


Figure 1. How characters are programmed to be sent to a printer

teletext chip which puts the coded signals on to the screen as recognisable characters does not use the exact ASCII codes, so some symbols appear differently. However, once in any other mode, these codes are interpreted by a different chip inside the computer which does get things right! The same thing can happen with printers too, the pound sign being a common example. Perhaps it should be called AASCII – American Almost Standard Code for Information Interchange.

Before delving into the depths of screen dumps, let's look at how graphics can be sent to the printer. The easiest way to do this is to see how single characters can be programmed and sent to the printer. The idea is to use the 'bit-image' mode. This is actually quite easy, although you'd never realise that from the average printer handbook.

First, draw a grid eight rows high by as many columns as required. In this example I am going to define a special symbol to represent one of the function keys. The symbol is shown in figure 1 and will print an 'f1' symbol on a black background. This is similar to the user-defined characters available in BBC Basic except that the number of columns can be any number and not just eight, and the definitions are added up vertically (starting at the bottom) instead of horizontally. Note that the ninth dot wire of the printer is not usually used in bit-image mode. Some makes of printer handle bit-image mode differently; the early Seikosha printers, for instance, worked from the top down, so that the example given here would appear upside down. It is fairly easy to modify the character definition to put this right. All the programs given here are designed to work on Epson-compatible printers.

The bit-image mode is set by using the ESC K command. This can be found in the printer handbook, usually in a chapter on graphics printing. The Epson FX80 handbook gives the command for this mode of printing as:

CHR$(27);"K";CHR$(n1);CHR$(n2);

Now that's enough to make anyone give up. Why such a complicated expression? Well, few printer handbooks are written with BBC in mind, and they are normally written in Microsoft Basic, a 'dialect' found on many other computers, but one not as good as BBC Basic. Therefore we have two problems. First to understand what the command is trying to do, and second, how to program that in BBC Basic. The bit image mode of the printer is set using the ESC K code. This translates into BBC Basic as VDU27,75. The number 27 is the ASCII code for the abbreviation ESC, and 75 the ASCII code for K. If you look at the VDU code summary in the *User Guide* you will see that code number 27 does nothing, but its ASCII abbreviation is ESC. The capital letter

K has the ASCII code number 75. (Note that k has a different ASCII code.) An easy way to find the ASCII codes for the various characters is to type a line similar to this:

PRINT ASC("K")

In this case the number 75 will be given. This does not work with the ASCII control codes in the range 0-31.

A problem with the bit-image mode is that, once it's set, all other codes are translated by the printer as data. Thus it would not be possible ever to switch off this mode. So the code has to be programmed in such a way that it will terminate itself. This is achieved by also including a number which gives the number of bytes of data which will be sent to the printer. The ESC K code has to be followed by two more bytes, which give the number of data bytes which are to be sent. As a large number of data bytes can be sent in the bit-image mode (up to 1920 per line on an 80 column printer), a two-byte number is required. The first byte gives the low part of the number (ie, number of data bytes MOD 256) followed by the high part of the number of bit-image data bytes (ie, number of data bytes DIV 256). Thus to send the character to the printer in bit-image mode, we need to send 11 bits of data. So our code translates to:

VDU 27,75,11,0

There is just one more thing that needs to be done. These codes need to be sent to the printer only, so we precede each one with a VDU1 code. VDU1 tells the micro to send the next byte to the printer only. Therefore we end up with:

VDU 1,27,1,75,1,8,0

a pretty far cry from:

CHR$(27);"K";CHR$(n1);CHR$(n2);

The computer can be used to find the values that you need for n1 and n2 by using the following short program:

```
10 INPUT"Enter number of columns "N
20 PRINT"n1 = ";N MOD 256
30 PRINT"n2 = ";N DIV 256
```

Having defined the symbol and sorted out bit-image mode, we can now get the printer to print out the symbol. Listing 1 in the yellow pages shows how this can be done. The printer is switched on by the VDU2 command, and off by the VDU3 command. The printing of the symbol is done by PROCsymbol. It first sends the bit-image code to the printer, and then sends each of the 11 bytes of data. When the character has been sent to the printer, the printer will return to the text mode and carry on printing normally. If the printer is expecting 11 bytes of data and receives only 10, it will hang up. If it receives more than 11 bytes then the extra bytes will be printed as normal ASCII symbols, and unexpected symbols will be printed out.

There are several variations on the bit-image mode. Most printers have 'dual density bit-image', and 'quadruple density bit-image' modes. Dual density symbols can also be drawn and these give a better print quality. This is printer code ESC L. Because each vertical row of dots overlaps the previous one, twice as many columns need to be sent. Listing 2 shows how this is done. The number of bytes sent is changed in line 150 to 22, and each column of data is repeated twice. A similar set of changes would need to be made for quadruple-density, although there is little improvement in quality.

Bit-image mode is not really too difficult. It is also quite easy to extend the ideas to a full screen dump. First we need to know how the computer's pictures are put on the screen. The graphics screen is based on a grid of 1280 dots across, 1024 dots up. The BBC does not work to this resolution, however, as the following chart shows.

Mode	Horizontal resolution	Vertical resolution
0	640	256
1	320	256
2	160	256
4	320	256
5	160	256

In all modes the vertical resolution is 256, but the horizontal resolution varies between 160 and 640. Screen dumps are slow, because they have to test each point on the screen and send that information to the printer. In mode 0 this requires testing 640 × 256 bits of information – 163,840 bits altogether.

The first consideration is the mode size, with the number of dots to be printed. The normal density bit-image mode gives 60 dots to the inch. On paper which is normally just over 8in wide, this gives a maximum of 480 dots per line. This is fine for modes 1, 2, 4 and 5 where there are 320 dots per line, but in mode 0, with 640 dots across, there is not enough room. Here double density bit-image mode is useful, as this allows up to 960 dots per line. Listings 3 and 4 show the two appropriate variations on the screen dumps. In each listing PROCcircle is a routine to draw a series of circles on the screen which are then dumped to the printer.

The dumps work in a similar manner to the symbols printed by listings 1 and 2, except that this time the screen is scanned using the POINT statement to determine which pixels are not in the background colour. In listing 3, the screen is scanned in a 320 × 256 grid, and in listing 4 in a 640 × 256 grid. The inner y% loop is used to build up the printer byte column, which is held in the variable D%. Integer variables have been used to speed up the screen dumps. They can be speeded up more by leaving out the variable after each NEXT. At the start of each line, the bit-image code is sent to the printer, and at the end of each line the new line code is sent. This is the VDU1,10. If your printer does not go on a new line with this dump then either change this line to read VDU1,10,1,13 or alter the printer 'dip switch' which gives a line feed to the 'on' position. Details of these dip switches can be found in your printer handbook.

Listings 3 and 4 can easily be changed so that they produce an inverse print, that is white lines on a black background. All that needs to be changed is line 340 in either listing to read:

340 IF POINT (X%,Y%−y%*4)=0 THEN D%=D%+1.

Similarly, it is possible to dump any colour combinations by changing that line. Thus to dump any red graphics in mode 1 line 340 would need to be changed to:

340 IF POINT (X%,Y%−y%*4)=1 THEN D%=D%+1

The references to X%, Y% and y% relate to those variables in listings 3 and 4.

Line 330:	Switch on printer
Line 340:	Set maximum Y% value to 1023
Lines 350-360:	Set line spacing to 8/72 inch
Line 370:	Start new line. Set X% to 0
Line 380-390:	Send bit-image command (line length 320 or 640)
Line 400:	Start new y% column
Line 410:	Perform equivalent of POINT
Lines 420-430:	Check POINT and increment byte if above 0 (Change BEQ to BNE for inverse dump)
Lines 440-460–	Subtract 4 from Y% and check column end
Lines 470-480:	Send byte to printer and increase X% value
Lines 490-520:	Check for end of line (X>1279)
Lines 530-540:	Reset printer and disable it
Line 550:	: Subroutine to send bytes to printer preceded by VDU 1. Accumulator value put on stack until VDU 1 has been sent

Description of listings 5 and 6

Codes	Effects	Amstrad DMP2000	Kaga 810	Olivetti PR15-B	Olivetti Inkjet JP101	OKI Microline 192/193	BMC	Smith-Corona D100	Smith-Corona D200/D300
8	Backspace	●	●	●			●	●	●
12	Form feed (new page)	●	●	●	●	●		●	●
13	Carriage return	●	●	●	●		●	●	●
14 20	Double width, 1 line only Cancel double width, 1 line only	● ●	● ●	● ●		● ●	● ●	● ●	● ●
15 18	Condensed mode Cancel condensed mode	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,45,1 27,45,0	Underline mode Cancel underline	● ●	● ●	● ●	27,42 27,43	● ●	● ●	● ●	● ●
27,48 27,49 27,50	Spacing 1/8" Spacing 7/72" Spacing 1/6"	● ● ●	● ● ●	● ● ●	27,69 27,70	● ●	● ● ●	● ● ●	● ● ●
27,52 27,53	Italics Cancel italics	● ●	● ●			27,37,75 27,37,72	● ●	● ●	● ●
27,56 27,57	End of paper detect off End of paper detect on	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,64	Initialise printer (reset)	●	●	●	27,48		●	●	●
27,69 27,70	Emphasised printing Cancel emphasised printing	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,71 27,72	Double-strike mode setting Cancel double-strike mode	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,77	Elite mode	●	●	●				●	●
27,78,n 27,79	Skip-over perforation setting Cancel skip-over	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,80	Pica mode	●	●	●				●	●
27,82,x	Int. character set English x= Int. character set American x=	●[1]	●[1]		27,91	27,33,n		0 2	0 2
27,83,0 27,84	Superscript on Superscript off	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,83,1 27,84	Subscript on Subscript off	● ●	● ●	● ●		● ●	● ●	● ●	● ●
27,87,1 27,87,0	Double width Cancel double width	● ●	● ●	● ●	27,51 27,52	● ●	● ●	● ●	● ●
27,97,n	Justify text (n=0-3)								
27,104 27,117	Set double height Cancel double height				27,39 27,37				
27,106,n	Reverse feed n/216"	●	●					●	●
27,112,1 27,112,0	Proportional print Proportional print cancel	● ●	● ●						
27,114 27,116	Reverse print on Reverse print off								
27,120,1 27,120,0	Near letter quality on Near letter quality off	● ●	27,40	27,52 27,53		27,73,3 27,73,1			27,59 27,59
Graphics commands: 27,65,n	Line spacing n/72"		●	●		●	●	●	●
27,75	Normal density bit image mode	●	●	●	27,71[2]	●	●	●	●
27,76	Dual density bit image mode	●	●	●		●	●	●	●
27,89	Double density bit image mode	●	●	●		●		●	●
27,90	Quad density bit image mode	●	●	●		●		●	●
27,42,n	Select bit image mode	●[1]	●[1]	●[1]				n=0-5	n=0-5

Notes: [1] *No more information available.* [2] *Uses different code sequence*

Standard printer codes for another eight printers

These screen dumps are painfully slow, and an appreciable saving in time is gained by using machine code. The technique for a machine code screen dump is exactly the same as for a Basic screen dump. The biggest problem with a machine code dump is the lack of the convenient Basic FOR . . . NEXT loop. An OSWORD call has to be made, equivalent to the Basic POINT routine when a accumulator parameter of 9 is used. The OSWRCH routine is the operating system equivalent of the VDU call.

One problem with the screen dumps so far is that they do not produce round circles. The reason for this is that printers print with a vertical spacing of 72 dots to the inch, and with a horizontal spacing of 60 dots to the inch. Thus the circles appear as ellipses. Some printers now include another graphics command. This is the ESC * code, which will allow several graphics variations. Epson printers have seven variations; some printers, including the Citizen 120D, have eight. This code, with a parameter of five, allows graphics with 72 dots to the inch to be produced, thereby offering true circles. The changes that need to be made to listing 5 are:

```
380 LDA #27:JSR printer:LDA #42:JSR printer: LDA #5: JSR printer
```

For those who have a printer like the Citizen 120D which has eight variations, the last one will produce a dual-density proportional screen dump. This can then be used with the mode 0 screen dump. The following changes need to be made to listing 6:

```
380 LDA #27:JSR printer:LDA #42:JSR printer: LDA #7: JSR printer
```

Note that this will not work on many printers.

Once a machine code dump has been made to work, it can be saved as it stands, and also the machine code element can be saved on its own. To do this, run the program and when it has finished type:

```
*SAVE SDUMP 900 +FF
```

and the machine code part will be saved to cassette or disc with the filename SDUMP. It has been located at &900, usually quite a safe area of memory, but other locations could be used. To use the screen dump from within programs, several options are possible:

1 Include the assembler procedure in the listing and run it at the start of the program. Then call it up as in listings 5 and 6.

2 Load in just the machine code element at the start of the program by including a line such as:

```
*LOAD SDUMP
```

and then call it up as required.

3 Disc users can load in and run the dump by including the line

```
*SDUMP
```

at the appropriate point in a program. The machine code dump must be on the program disc, and, of course, the disc will have to be kept in the disc drive while the program is running. This technique is very useful if memory space is a problem.

A final point on the note of screen dumps. The graphics origin must be set at 0,0 to produce a full screen graphics dump. Otherwise the dump will include areas that are off the screen and these will be printed in black.

QUICKFIRE QUESTIONS

Staying on the subject of printers, this month's quick hints are all connected with printers.

- Do get the printer paper thickness setting correct. This is a small lever at one side of the roller. It gives a blacker print and makes the printer run more quietly with less wear.
- Having set the dip switches on the printer, do not change them when a new effect is required. These switches are not designed for frequent use, and will soon become unreliable. Use software commands instead.
- Having trouble loading fanfold paper? Load it in at the first fold with the paper doubled-up.
- Do the descenders (the tails on the ys and gs, etc) on your printer look faint? This is because with infrequent use they tend to get gummed up and stick. Free them off by printing a few lines of gs or ys – eg, enter the following line:

```
VDU2:FOR N=1 TO 5000:P."y";:
NEXT:VDU3
```

STANDARD PRINTER CODES

In January's Hints and Tips I asked for help to produce a comparison chart of printer codes for a whole range of printers. This was to make it possible to see at a glance which codes are standard and which are not.

The codes for the first 10 printers were published last month and this month eight more are included (see table 1, opposite). The codes published are those which are generally the most useful; they do not represent the total list of codes.

For instance, the printer tab commands have not been included as a wordprocessor can do just as well by adding spaces or using Tab, without having to resort to these specialist printer commands, and few if any programs need to make use of them.

FURTHER READING FROM ACORN USER

Here is an index of printer dump articles and listings published in *AU* over the last three years

QUINN'S QUICKIE

Many readers have written to us with comments on the reviews of Mirrorsoft's *Fleet St Editor* and the AMX *Pagemaker* in the May and June issues. To clarify one of the major points, none of the pictures in the *Pagemaker* review, and just two in the *Fleet St* review were supplied with the package.

The cartoon figures of Willy Whitelaw, Leon Brittan, Flook, Jane and Spiderman were done by tracing enlarged photocopies of the originals on to a clear plastic bag with a ballpoint pen.

The tracing was then stuck on the monitor and used as a guide when drawing from scratch. Days of pixel-editing did the rest!

FIRST BYTE

MACHINE CODE MADE EASY

The second of two articles on machine code programming: how to combine Basic in your programs

Tessie Revivis

Writing long programs in machine code can be quite time-consuming. Many software houses first write their programs in Basic to work out the logistics before translating the software into machine code. In many cases a first-rate compromise can be made by combining machine code and Basic – the main framework of the program is written in Basic and then the sections that need to work fast (typically animation or moving large areas of memory) can be translated into assembler, with the machine code being called at the appropriate points within the program. Some examples will make this clearer.

```
   10 REM First Byte - lis
ting 1
   20 REM Passing values
   30 REM by Tessie Revivi
s
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User S
eptember 1986
   60 :
   70 DIM code% 255
   80 PROCass
   90 PRINT''"Press any ke
y"''
  100 key%=GET
  110 FOR loop%=ASC"A" TO
ASC"z"
  120 A%=loop%
  130 CALL code%
  140 NEXT loop%
  150 END
  160 :
  170 DEF PROCass
  180 P%=code%
  190 [
  200 JSR &FFEE
  210 RTS
  220 ]
  230 ENDPROC
```

Listing 1. Program to print the alphabet

Listing 1 is similar to that published last month in that it will print the alphabet. However, unlike the earlier program, the control loop used to move from the letter A to the letter Z is written as a FOR . . . NEXT loop in Basic. The machine code assembled by PROCass simply prints the current letter, and this is called from within the FOR . . . NEXT loop. The current letter, defined by the ASCII code held in loop% is passed into the machine code via the integer variable A%. Because the accumulator can only hold numbers in the range 0-255 the value of A% should also be kept in this range. Attempts to pass higher values will not work as expected. The variables X% and Y% may also be used to pass values to the X and Y registers in the same fashion. Thus values may be seeded into these registers from Basic very easily. The example in listing 1 is very simple and does nothing spectacular, other than clearly demonstrating the point.

1	1	0	0	0	0	1	1
1	0	0	0	0	1	1	0
0	0	0	0	1	1	0	0
0	0	0	1	1	0	0	0
0	0	1	1	0	0	0	0
0	1	1	0	0	0	0	0
1	1	0	0	0	0	0	0
1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Figure 1. Bits on the move

Listing 2, on the other hand, is much more interesting: a good way of ending a screen display is to make it wither away – which *Repton* does to good effect. It seems complicated at first but with some knowledge it can be written in just 27 bytes of machine code. Listing 2 contains several mnemonics which we have not yet discussed but that should not stop you from entering and running the program to see the effect. Briefly, what is happening is that the machine code is accessing every byte on the screen (and there are 20480 in all!) and shifting the 8 bits which make up the byte along by 1 bit at a time to the left so that the left-most bit falls off. The empty right-most bit is replaced with a zero – which shows up as black on the screen. Figure 1 shows how this works – if you follow the two 1s on the right, they shift to the left and appear to work their way through the byte, falling out on the left-hand side after eight shifts to the left.

This type of shift is known as an Arithmetic Shift Left which has the mnemonic ASL in assembly language. Why arithmetic? The answer is because it undertakes a fundamental mathematical operation – shifting the bits to the left by one position effectively doubles the byte's value! To understand how this works requires a knowledge of binary representation – the Jan 86 issue of *AU* had a description of this on page 61 so look there if you need the detailed explanation. In summary, though, each bit position is greater than the first by a power of 2, so the left-most bit has the value $2^0=1$, the next bit the value $2^1=2$, the next bit $2^2=4$ and so on up to the eighth bit which has the value $2^7=128$ (2*2*2*2*2*2*2). The binary value 00000011 breaks down to 2^1+2^0 which simplifies to $2+1=3$. Shifting left by one position gives 000000110 which is $4+2=6$.

The operation which complements ASL is LSR – Logical Shift Right. This halves the value of the byte in question – you might like to try to adapt listing 2 to 'wither' the picture off screen in the opposite direction.

Two-pass assembler

The assembler in the BBC micro and Electron is referred to as a two-pass assembler – because it's often necessary to assemble a program twice by enclosing it within a FOR . . . NEXT loop, as we did in listing 2. The reason can be found by studying listing 2 and referring back to listing 2 of last month's First Byte. There we defined a label that could be jumped to by the program, thereby enabling it to loop, rather like this segment of an assembly language program:

```
100 .start
110 TYA
120 JSR &FFEE
130 INY
140 CYP #ASC"Z"
150 BNE start
```

When the program is run the assembler assigns an address to the label 'start' – when it reaches line 150 it can calculate just where the program needs to jump back to. However, consider the following segment:

```
100 CPY #ASC"Y"
110 BNE end
120 TYA
130 JSR &FFEE
```

```
   10 REM First Byte - lis
ting 4
   20 REM Memory Mover
   30 REM by Tessie Revivi
s
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User S
eptember 1986
   60 :
   70 DIM code% 255
   80 bytes=&70
   90 end=&72
  100 start=&74
  110 S%=&3000:E%=&5800:L%
=&2000
  120 MODE 1
  130 :
  140 REM Basic Version
  150 PROCscreen(12,27,"Ba
sic Version")
  160 PROCw(3,16,37,13,1,2
)
  170 PROCc(14,"Please pre
ss any key")
  180 key%=GET
  190 FOR loop%=0 TO L% ST
EP 4
  200 !(E%+loop%)=!(S%+loo
p%)
  210 NEXT
  220 :
  230 REM Machine Code Ver
sion
  240 PROCscreen(9,30,"Mac
hine Code Version")
  250 PROCw(3,16,37,13,1,2
)
  260 PROCc(14,"Please pre
ss any key")
  270 key%=GET
  280 !bytes=L%
  290 !end=E%
  300 !start=S%
  310 PROCass
  320 CALL memmove
  330 A=GET
  340 RUN
  350 END
  360 :
  370 DEF PROCass
  380 FOR pass=0 TO 2 STEP
 2
  390 P%=code%
  400 [
  410 OPT pass
  420 .memmove
  430 SEC
  440 LDA end
  450 SBC start
  460 TAX
  470 LDA end+1
  480 SBC start+1
  490 TAY
  500 TXA
  510 CMP bytes
  520 TYA
  530 SBC bytes+1
  540 BCS moveleft
  550 BCC moveright
  560 .moveleft
  570 LDY #0
  580 LDX bytes+1
  590 BEQ lpartpage
  600 .leftpagess
  610 LDA (start),Y
  620 STA (end),Y
  630 INY
  640 BNE leftpagess
  650 INC start+1
  660 INC end+1
  670 DEX
  680 BNE leftpagess
  690 .lpartpage
  700 LDX bytes
  710 BEQ exit
  720 .lastleft
  730 LDA (start),Y
  740 STA (end),Y
  750 INY
  760 DEX
  770 BNE lastleft
  780 .exit
  790 RTS
  800 :
  810 .moveright
  820 CLC
  830 LDA bytes+1
  840 PHA
  850 ADC start+1
  860 STA start+1
  870 CLC
  880 PLA
  890 ADC end+1
  900 STA end+1
  910 LDY bytes
  920 BEQ rightpages
  930 .transfer
  940 DEY
  950 LDA (start),Y
  960 STA (end),Y
  970 CPY #0
  980 BNE transfer
  990 .rightpages
 1000 LDX bytes+1
 1010 BEQ exit
 1020 .update
 1030 DEC start+1
 1040 DEC end+1
 1050 .page
 1060 DEY
 1070 LDA (start),Y
 1080 STA (end),Y
 1090 CPY#0
 1100 BNE page
 1110 DEX
 1120 BNE update
 1130 RTS
 1140 ]
 1150 NEXT
 1160 ENDPROC
 1170 :
 1180 DEF PROCscreen(lf%,r
t%,A$)
 1190 VDU 23,1,0;0;0;0;
 1200 COLOUR 129:CLS
 1210 PROCw(3,5,37,2,1,2)
 1220 PROCc(3,"Acorn User'
s Memory Mover")
 1230 PROCw(lf%,11,rt%,8,1
,2)
 1240 PROCc (9,A$)
 1250 ENDPROC
 1260 :
 1270 DEFPROCc(y,t$)
 1280 VDU 26,31,20-LENt$/2
,y
 1290 LOCAL w:w=&70
 1300 FOR z=1 TO LEN t$
 1310 ?w=ASC MID$(t$,z,1)
 1320 A%=&A:X%=&70:Y%=0:CA
LL &FFF1
 1330 VDU 23,224,w?1,w!1;w
!2;w!3;w?4,23,225,w?5,w!5;
w!6;w!7;w?8,224,8,10,225,1
1
 1340 NEXT
 1350 ENDPROC
 1360 :
 1370 DEFPROCw(l,d,r,u,p,q
)
 1380 VDU 24,l*32-16;(31-d
)*32-16;(r+1)*32-16;(32-u)
*32-16;18;131,16,24,l*32-1
2;(31-d)*32-12;(r+1)*32-20
;(32-u)*32-20;18;128,16
 1390 COLOUR p:COLOUR 128+
q
 1400 VDU 28,l,d,r,u,12
 1410 ENDPROC
```

Listing 4. Moving blocks of memory, first using Basic, then machine code

140 INY
150 .end

Now when line 110 is reached, the program will have no idea where 'end' is (as it has not yet encountered it) and so an error will occur. In two-pass assembly the first pass is used by the assembler to find out just where all the labels are and to assign addresses to them; in the second pass the assembler has access to a table of these addresses which it can then assign to the instructions that require them.

Look again at listing 2 and you can see how the two passes are implemented. What is not immediately obvious is why the particular step size is used (line 380). The answer lies in the assembler pusedo-mnenonic called OPT. This controls the way in which your assembler carries out the two-pass assembly – there are three different ways which are summarised in table 1 on page 57.

The loop used in the listing suppresses errors in the first pass (vital, otherwise an unrecognised label would cause an error) and allows them during the second pass (again vital as you may actually have an error!). The use of an OPT value of 2 during the second pass also suppresses the assembler data listing being displayed on the screen – try changing the two 2s in line 170 to 3s:

380 FOR pass% = 0 TO 3 STEP 3

and you will see an assembly data listing displayed when you run the program. The only other important point to remember in two-pass assembly is that the value assigned to P% takes place within the loop. This is so that the code is assembled in the correct position during the second pass and not on the end of the first erroneous piece of machine code, which would otherwise be the case.

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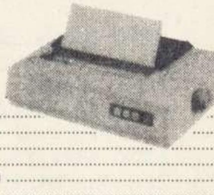
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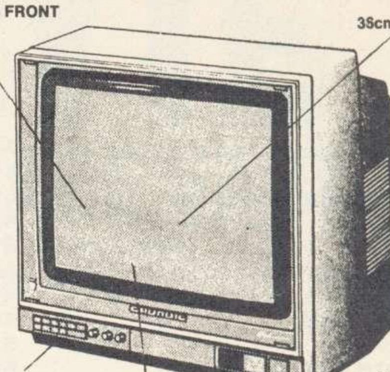
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0 Assembler errors suppressed, no listing.
1 Assembler errors suppressed, listing.
2 Assembler errors reported, no list.
3 Assembler errors reported, listing.

Table 1. Summary of OPT values

Addressed up

Look at any assembly program and you will notice that many of the mnemonics it contains are similar but the operand can take a different format (see last month's article). This format is called the adressing mode. Listing 3, when run, will print the letter p on the screen – the ASCII code for the letter is loaded into the accumulator in line 110. Because the action is done immediately by the machine code, the address-

```
   10 REM First Byte - lis
ting 3
   20 REM Print a 'p'
   30 REM by Tessie Revivi
s
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User S
eptember 1986
   60 :
   70 DIM code% 20
   80 oswrch=&FFEE
   90 P%=code%
  100 [
  110 LDA #&70
  120 JSR oswrch
  130 RTS
  140 ]
  150 PRINT'''
  160 CALL code%
```

Listing 3. Immediate addressing at line 110

ing mode is known as immediate addressing – the ASCII data is immediately after the opcode in the operand. The immediacy is implied by the hash after the mnemonic. Now change line 110 so that the hash is deleted:

110 LDA &70

and re-run the program – the result will be random because we have now changed the addressing mode so that the accumulator is loaded with the contents of the location &70 – the operand is no longer treated as the immediate data byte but rather the address where the data is stored. Type:

?&70 = &70

Location &70 with zero page now contains the ASCII code for p; if you re-run the program a p will be printed. Poking any value into &70 will result in the value being displayed as an ASCII character. As an exercise try writing a program using this technique to print the alphabet backwards. Because the data is stored in zero page this type of addressing is known as zero page addressing.

The next question is how does the machine

```
   10 REM First Byte - lis
ting 2
   20 REM Withering Screen
   30 REM by Tessie Revivi
s
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User S
eptember 1986
   60 :
   70 MODE 1
   80 DIM code% 500
   90 count=&70
  100 PROCass
  110 PRINT"Press a key...
"
  120 any=GET
  130 REM Insert MODE x fo
r mode required
  140 REM Insert *LOAD <sc
reen name>
  150 CALL shift
  160 END
  170 :
  180 DEF PROCass
  190 FOR pass%=0 TO 2 STE
P 2
  200 P%=code%
  210 [
  220 OPT pass%
  230 .shift
  240 LDY #8
  250 .shiftloop
  260 LDA #&30
  270 STA addr+2
  280 LDX #0
  290 .addr
  300 ASL &3000,X
  310 INX
  320 BNE addr
  330 INC addr+2
  340 BPL addr
  350 DEY
  360 BNE shiftloop
  370 RTS
  380 ]
  390 NEXT pass%
  400 ENDPROC
```

Listing 2. Two-pass assembler at work

code know which addressing mode is being used when it comes to interpret the opcode. The answer is in the opcode. When the assembly language program is run the assembler generates an opcode which also distinguishes the addressing mode. If you re-run both versions of listing 3 and look at the assembly data you will see that the opcodes for LDA# and LDA are different from one another: &A9 for immediate addressing and &A5 for zero page addressing.

The addressing mode is not limited to just the LDA mnemonic. In fact most mnemonics, though not all, will allow some if not all addressing modes to be used. Another type of addressing mode is 'absolute addressing'. Here, absolute means a two byte address, ie &7C00 is an absolute address. With second processor and shadow memory switched off (if you have them) you can write directly to the screen memory. Make the following changes to listing 3:

110 LDA #&33
120 STA &7C00
150 MODE 6

When you run the program now, you will notice that two small lines will have appeared roughly in the centre, two-thirds of the way down the screen. To understand why we have two lines, look at the bit pattern for &33 – 00110011. A 1 shows up as a white dot and a 0 as a black dot – thus we have two sets of two dots, which appear as short lines.

Addressing modes are therefore important – the 6502 has a basic set of 55 mnemonics, but the use of different addressing modes effectively extends this to 152 different operations.

On the move

The final program presented this month (listing 4) is both a good demonstration of the speed at which machine code runs and also provides a useful routine which you might like to try to incorporate into your own Basic programs – particularly those involving animation. Simply, it can intelligently move large blocks of memory. When run the program displays a simple mode 1 screen with some text windows; the top section of this screen is then copied to the lower half in Basic, though rather slowly. When this is complete it does the whole thing again, but this time uses a machine code move routine in the bat of an eyelid. Note that this program, like listing 2, accesses the screen directly – so make sure that you turn any Shadow RAM or second processor off before you enter it.

The program is simple to use because it requires just three pieces of information: the start address of the area of memory to be moved (S%), the destination 'end' address (E%), and the length in bytes of the memory block to be moved (L%). These variables are set in line 110 of the program.

The last two months should have shown just how easy it is to use assembler. Even if you have not used it before, you do not have to be an expert to type in assembler listings from magazines such as *AU* or from books. Do experiment with the listings presented on these pages by incorporating them into your own programs.

We have only scratched on the surface of the subject – it is a large one – and I will be returning to it on a more regular basis. In the meantime why not buy a book on the subject or borrow one from your library and have a bash at getting into assembler. A personal recommendation would be *Mastering Assembly Language* published by BBC Publications.

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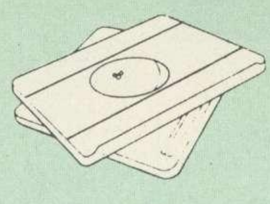
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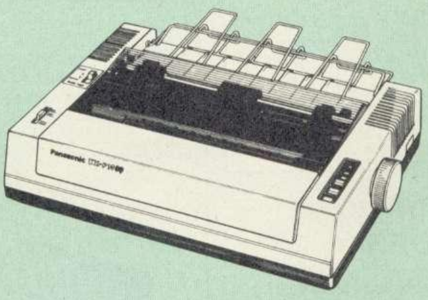
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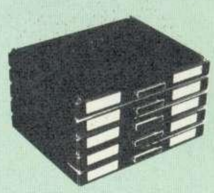
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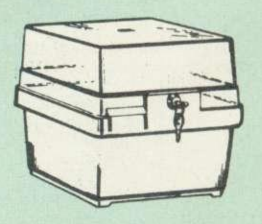
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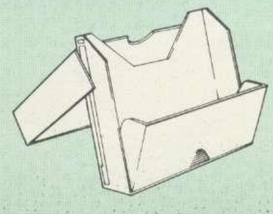
£8

LOCKABLE DISC STORAGE UNITS



Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£11**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£2.00**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

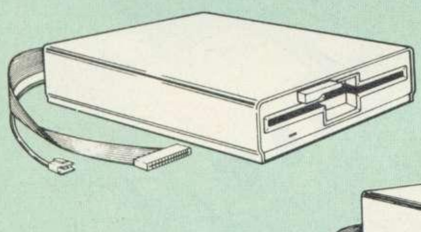
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). Both are of Japanese manufacture.

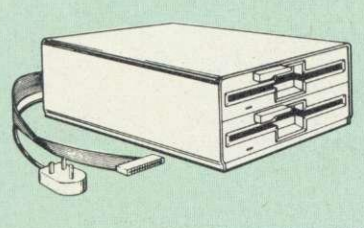
With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

***All our Disc Drives (except CLS100) are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. We are now able to supply all single Disc Drives with Power Supply, in either single or dual cases. (Dual cases with a blanking plate, allow easy expansion at a later date.) Prices stated in the pricing box below for single drives in a single case. Single drives with dual cases cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space; your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 8th page of our advert for the Plinths).





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £95		CS 100 £116	
200K (360K)	CLS 200 £102	CLD200 £185	CS 200 £116	CD200 £199
400K (720K)	CLS 400 £104 / £105 CLS400S	CLD 400 £185	CS400 £123 / £124 CS 400S	CD400 £205
800K (1.44M)		CLD800 £194 / £195 CLD 800S		CD800 £218 / £219 CD 800S

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£10**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£17**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£17**
- *Hi-Density 1.6M D/S D/D for IBM* **£32**

3½"
- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£9**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£11**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£15**

- *3" Double Sided Discs* **£4** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	**£16**	**£40**
M5	Double/Side Double/Density 48TPI	**£20**	**£52**
M7	Double/Side Double/Density 96TPI	**£27**	**£65**

DUST COVERS (For our Disc Drives)

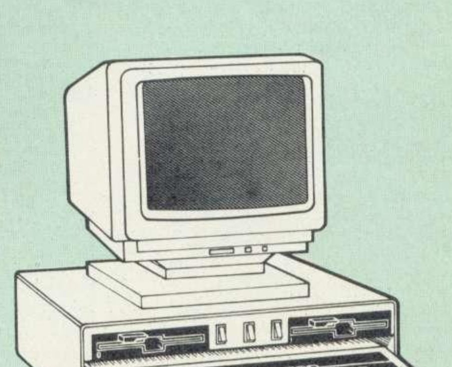
Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

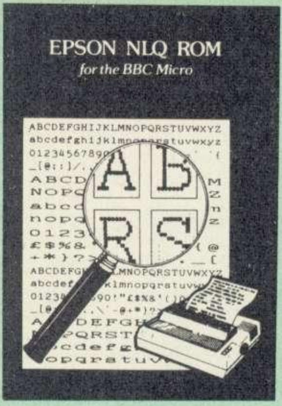
10 Megabytes **£1050;** 30 Megabytes **£1549**

CDP 800S



Twin 800K Double sided 40/80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

Introductory price: £239
(Securicor Carr. £7)



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

A 40 or 80 track (please specify) disc containing 3 example fonts is included in the package.

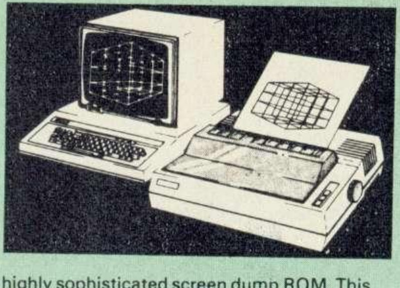
(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

ALL PRICES EXCLUSIVE OF VAT

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

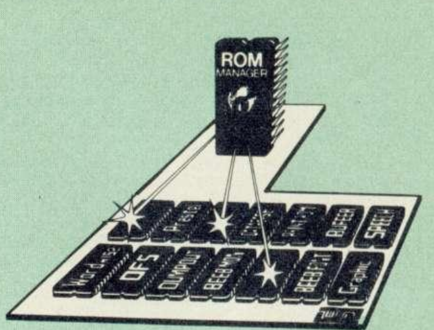
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER

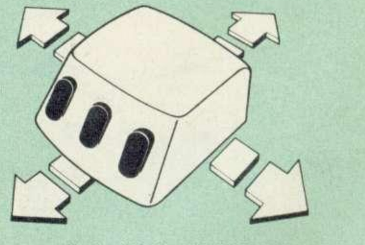


Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)
Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.
Many more facilities available.

SPECIAL OFFER £18

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

FREE With every AMX Mouse package purchased from us, we are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15.**

AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£42
AMX PAGE-MAKER Pack	£42
AMX 3D ZICON Disc	£20
AMX Database Disc	£20
AMX XAM Educational	£20

RB2 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

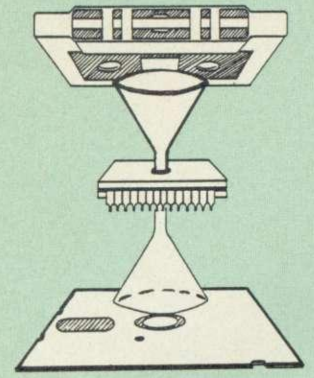
Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

TRANSFEROM

(Tape to Disc Utility)



Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

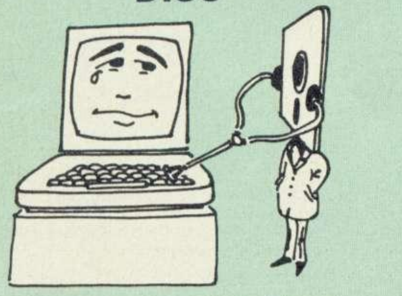
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

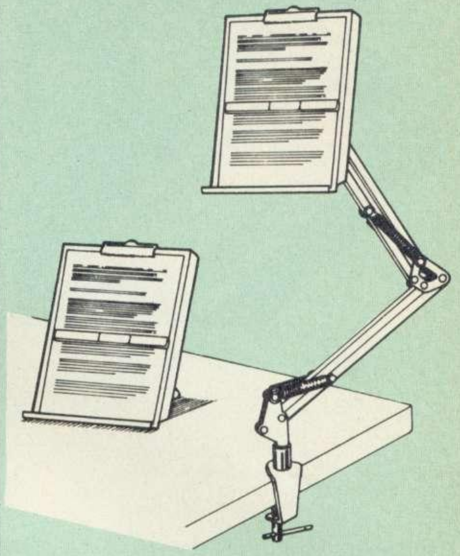
Compatible with: View, Wordwise & Wordwise

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** *(carr. £3)*

All prices in this advert are exclusive of VAT.

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM

ONLY **£16**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

Complete System	**£12**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

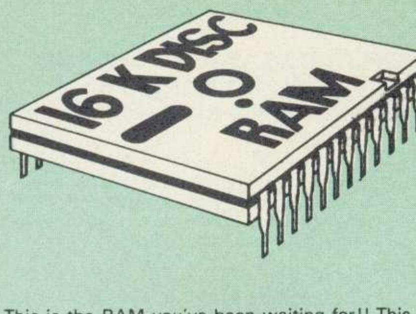
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices exclusive of VAT



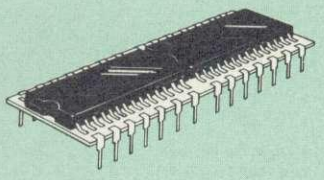
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

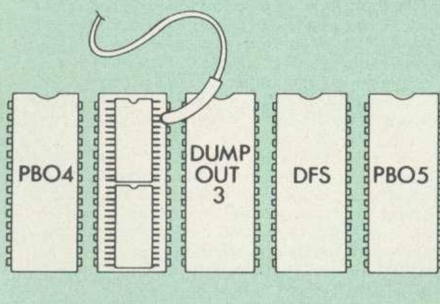
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

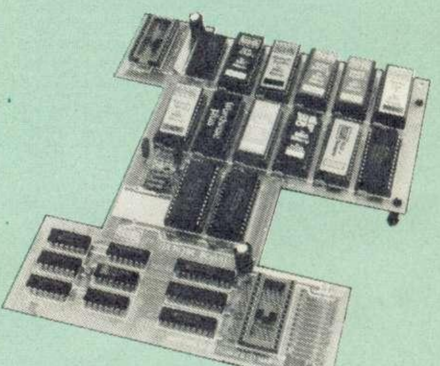
Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.
Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

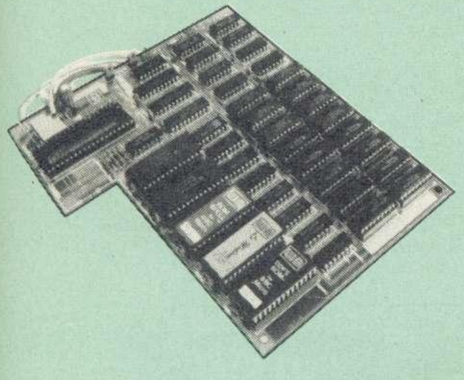
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£45***
● *ROM/RAM card with 64k dynamic RAM*	***£65***
● *ROM/RAM card with a massive 128k dynamic RAM*	***£99***

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£6***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2 each***
Complete ROM/RAM board (all options installed)	***£115***

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to MicroLink.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£115

(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

BT TELEPHONE CONNECTORS

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

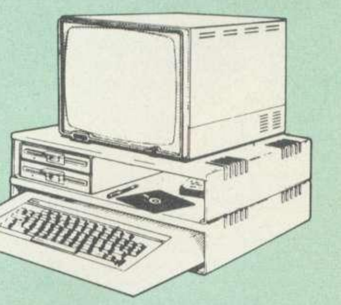


The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£27
Graphics ROM	£23
Disc Doctor ROM	£24
TERMI	£27
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £25

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid
The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET £40

INTER-CHART ONLY: £26

Computer Concepts' long awaited

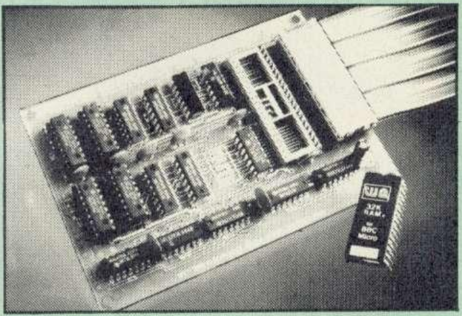
Inter-WORD
Only: £49

Special price to Wordwise Plus owners. Please quote your reg. number and pay.

Only: **£39**

All Prices Exclusive of VAT

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B+ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£37**

VIEW 3.0 ROM
Price: Only **£56**

HI-VIEW
A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL	**£50**
VIEWPLOT Disc	**£25**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED
(Officially approved by Silver Reed)

Only: £10

SPECIAL OFFER
Acorn's Speech Synthesiser Package

Complete with manual in its original packaging

Clearance price Only: **£19**

ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) sofket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on he board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234/33383

النور

ARABIC ROM for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

OFFICE MATE

Database – Set up a computerised "card index" system and add record/data to the file your way. Features include search, sort, mathematical calculations, printer routines, data summaries, etc.

SPREADSHEET – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT – Provides an easily assimilated visual representation of numerical data.

WORDPROCESSOR – Provides many routines found in large and expensive packages.

OFFICE MATE Only £10
(Cassette or Disc)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock value, current gross margin, cost of bringing stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**
(Cassette or Disc)

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom
Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17

D D D Suite Integrated Software System

-BASE **£15**
-CALC **£15**
-PLOT **£15**

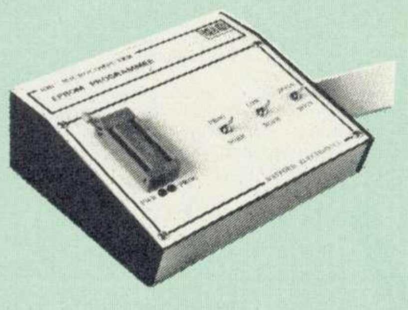
COMBO PACK All 3 together **£36**

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£12.95
68000 Programming the	£22.95
6809, Programming the	£16.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for BBC	£6.95
Advanced User Guide for BBC	£13.50
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£9.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Master 128 High Flyer	£10.95
BBC Micro Advanced Ref. Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro Disc Companion	£8.95
BBC User Guide	£10.00
BCPL User Guide	£14
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.50
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£16.50
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Micro Play	£6.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Interfacing Your BBC Micro	£8.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the Z80	£19.95
Sencing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View 3.0 User Guide	£10
View Guide	£4.50
Viewsheet User Guide	£10
Viewstore User Guide	£10
Using BBC Basic	£4.95
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Assembly Language Programming	£19.95

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

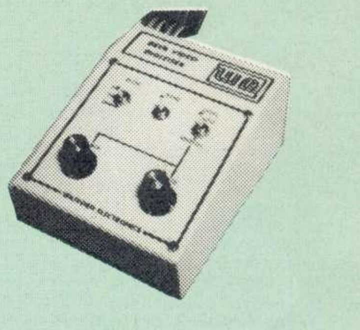
SPECIAL OFFER £69 (£3 carr.)

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This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

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(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

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Dennis Spitz Computers Inc, 86 Golders Green Road, London NW11

Greenbank Electronics, 92 New Chester Road, New Ferry, Wirral, Merseyside

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Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford, St. Helens

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Alpha Computer Co, Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong, Tel: 5-506592

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ECD BV, Voldersgracht 26, 2611 EV Delft, Holland

LENDAC DATA SYSTEMS, 8 Dawson Street, Dublin 2, Ireland

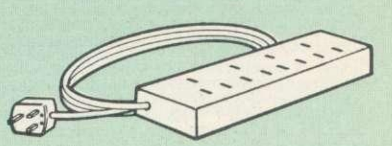
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Techno-Matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark

Velobyte, Scheaedyksadyk 5A, 3011 EB Rotterdam, Holland, Tel: 4138197

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These facilities transform the capability of the BBC Micro when dealing with tasks such as graphical transformations in two or three dimensions, or structural analysis, electrical circuits or vibration problems. In fact any problem where matrix operations or linear simultaneous equations are involved. The power of ***FORTRAN*** can now be combined with the simplicity of ***BASIC*** and the excellent graphics of the BBC micro.

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AA186

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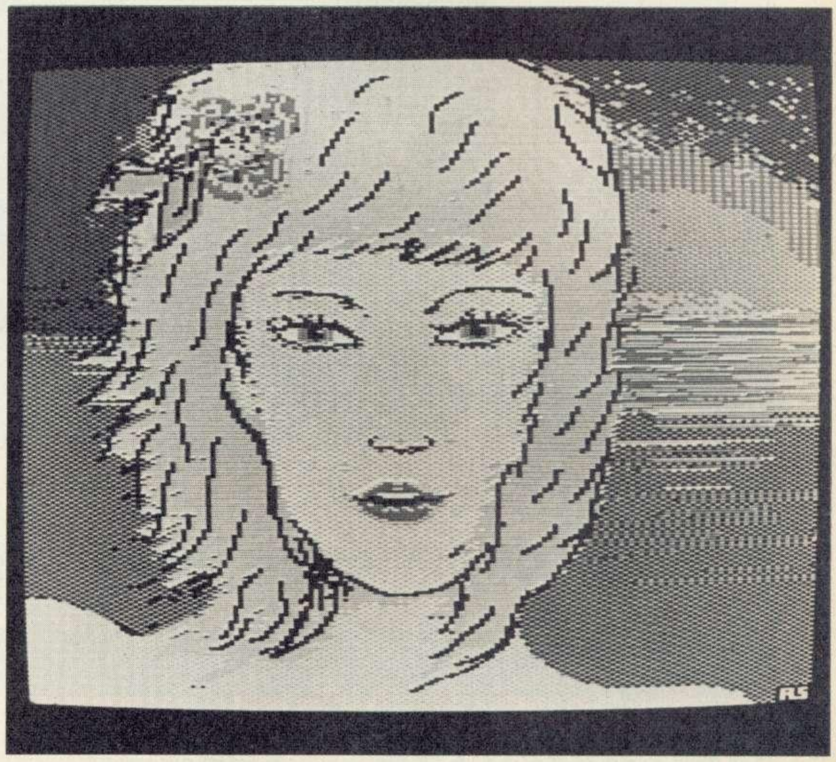
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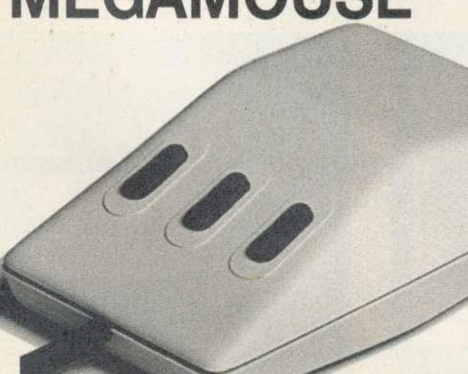
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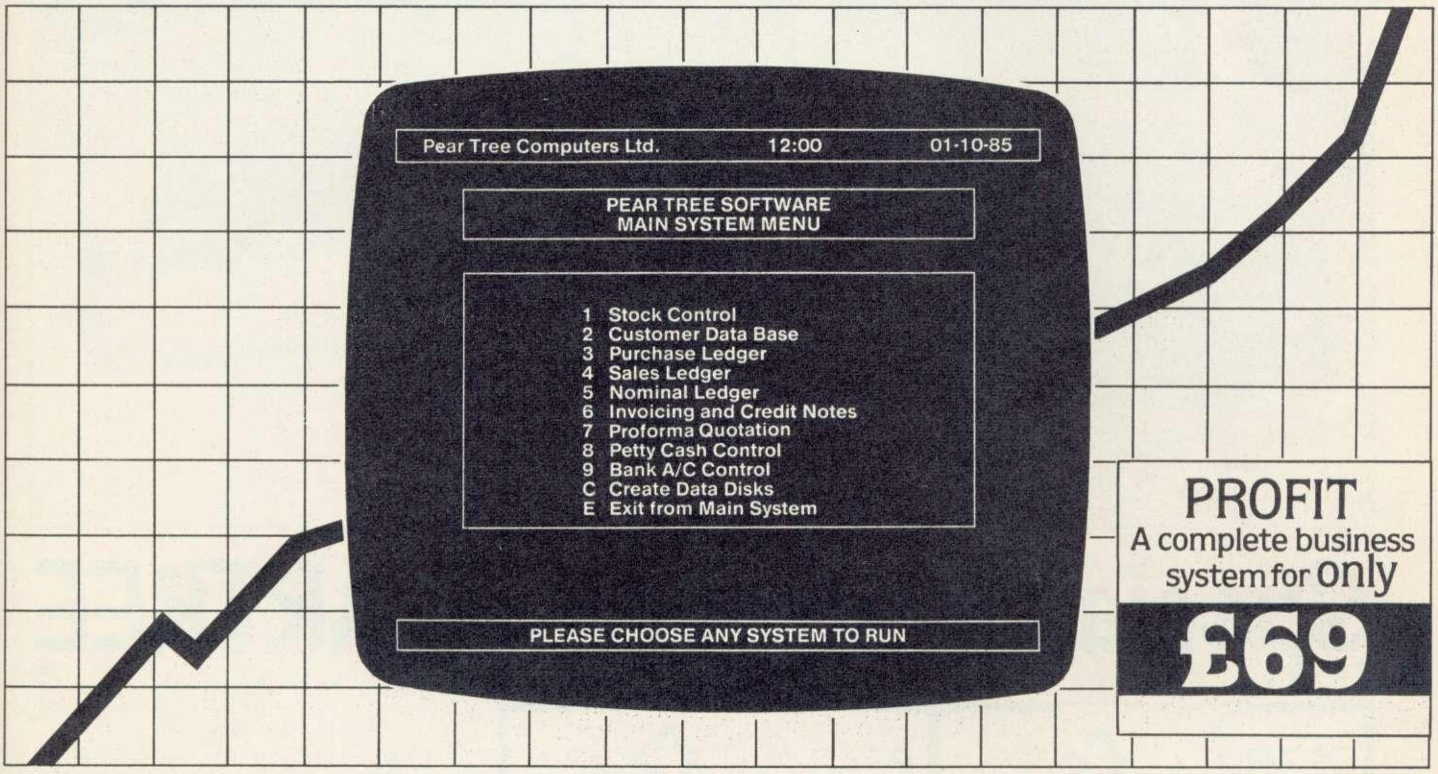
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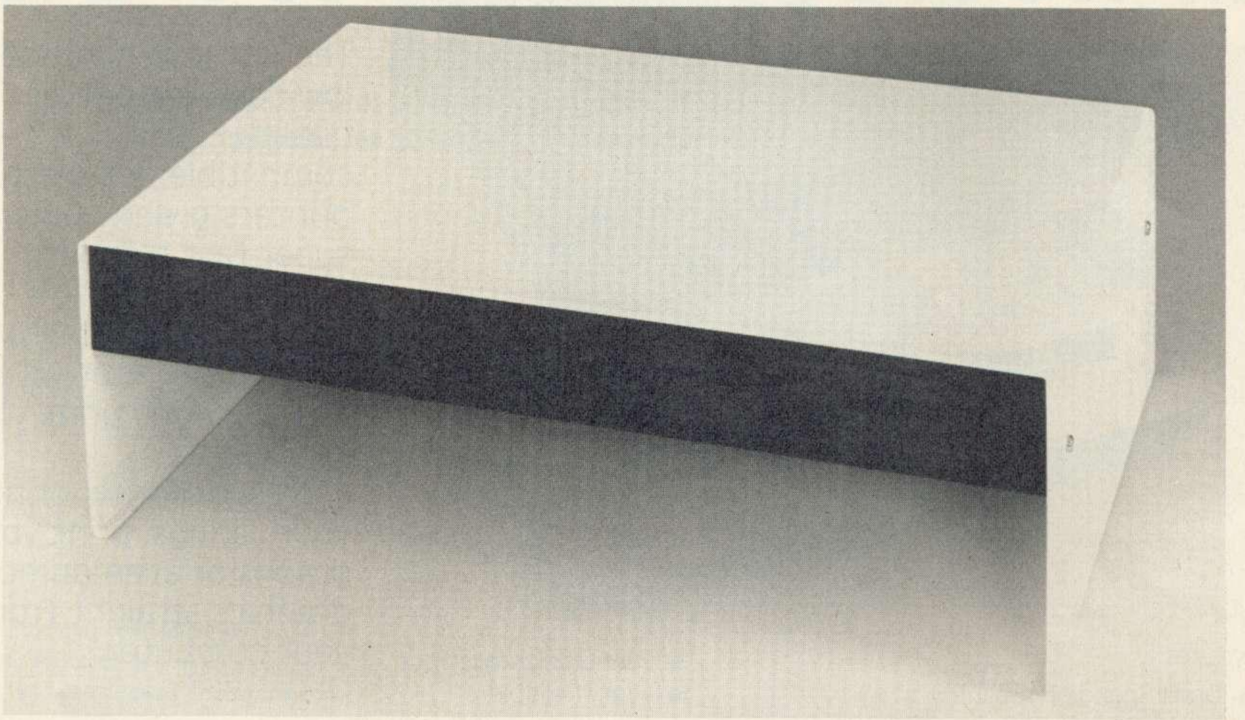
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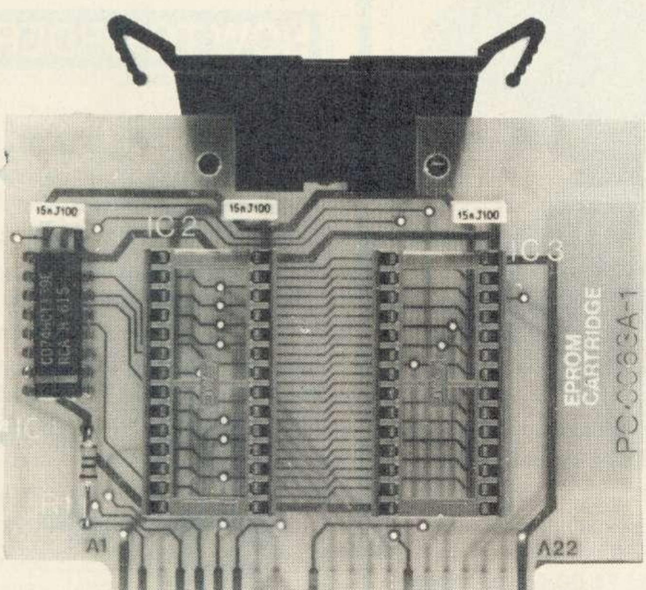
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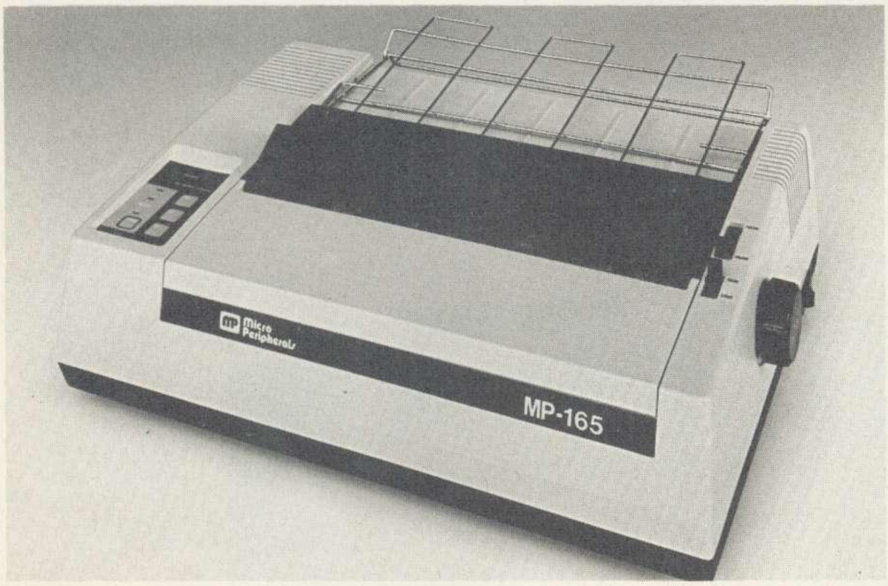
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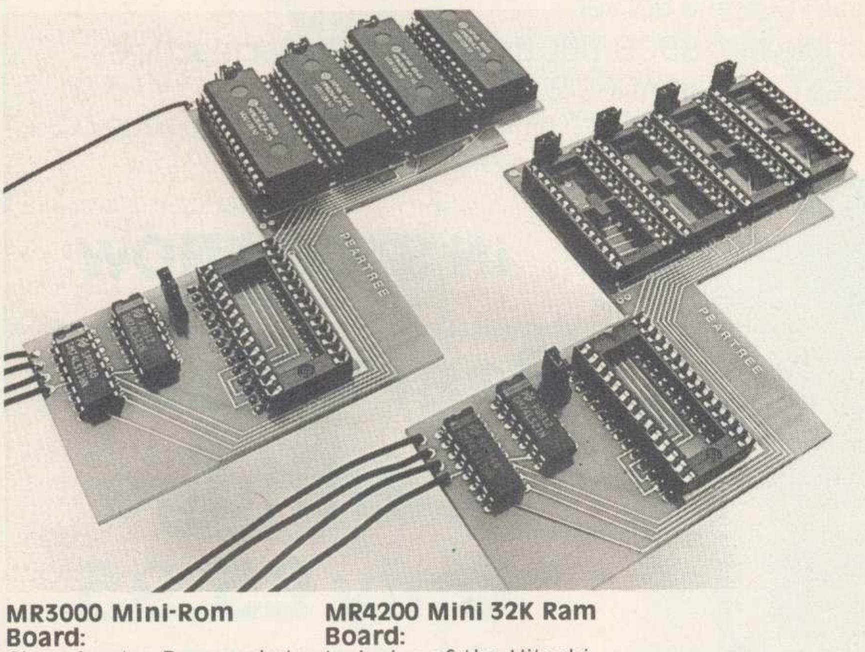


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ON THE MENU

A visible menu is one of the most popular ways of communicating with an operational program. Joe shows how to devise menus to fit most situations

Joe Telford

One of the problems we all come up against is that of communicating with an operational program. Many of the Teach-yourself-Basic-type books begin with an apparently simple little program such as:

```
INPUT x
LET a=x*2
PRINT a
```

and spend little time considering the necessary explanations for input or output. In fact it is important that we understand what the computer program requires of us, and what information it is presenting. The menus given in this article should work on all versions of the BBC micro, Master 128, Electron and 6502 second processors.

I once started a talk about the Human Machine Interface (HMI) with the statement: 'There are three major ways in which we can control the execution of a program!' A voice from the back called out 'Don't you mean four?' Not wishing to demean myself I continued, 'There are three major techniques, beginning with the menu-driven approach.' There was a slight pause, and the voice from the back of the hall called out, 'Five!'

The moral of the story is that we should always get our frame of reference agreed by everyone as quickly as possible. So let's start by considering just how we can control the execution of a program. This is quite an easy task. Examining a range of software should lead us to some generalisations.

Elite is controlled by joysticks, paddles, mice and tracker balls, so we need to include control by external devices as one item on our list. *Wordwise* is a classic example of a single keypress control system working from a menu. *The Hobbit* adventure has an almost free-form sentence entry format. *AU*'s *Super Painter* program employs a single key control system operating from the function key overlay. *The Basic Editor* uses a combination of single word commands and single function key presses.

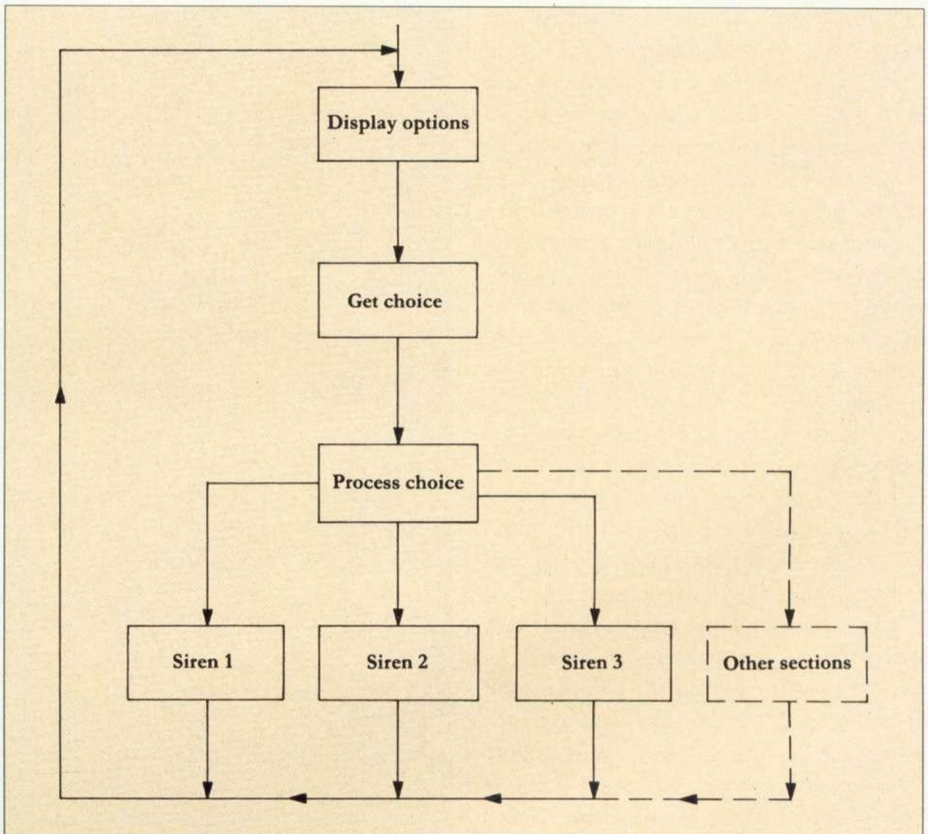


Figure 1. The structure of a typical menu. The main menu is enclosed in a loop

OK, so what does this boil down to? Well it does actually (and conveniently for me) reduce to three main types of control systems:

1. The visible menu and associated single word entry
2. Invisible menus and associated single key presses (including joysticks, etc)
3. The free format command sentence which is then decoded and acted on.

The only one of these which needs immediate amplification is the invisible menu of item 2. An invisible menu includes those commands which are shown on a function key overlay strip or the regularly-used keys for, say, *Snapper*. Have you ever thought how you would play *Killer Gorilla* successfully with a screen that continually showed:

Press z for left
x for right
/ for down
: for up
Return to jump

In this article I show how to create visible menus, which direct the user to enter particular keypresses, how the computer can process that input, and how to protect against some of the problems that arise.

Adapting one of the menus given will fill

most situations. In future articles I'll cover other types of program control.

A visible menu has three parts: the action of displaying information; the process of accepting the users entry; and the action of selecting an appropriate part of the program as a result of that entry.

Strictly speaking a menu is mainly concerned with the first of these two points, but the approach to the third part often has to be modified depending on the specific menu. Figure 1 is a diagram of a typical menu and its component parts. Notice that it is usual for the main menu in a program to be enclosed in a loop so that choices can be made a number of times. Visible menus are most often used in programs where the maximum number of choices are limited and the program writer can handle all possible outcomes. Of course such menus leave themselves open to 'If only he'd added facility xxx', but generally they provide the simplest and most effective means of communication between user and program.

Many menus use single key presses to indicate the user's choice. My approach with a visual menu which requires alphanumeric input is that we should always: put up some sort of prompt; allow the user to type and delete characters; expect the user to press Return to confirm that choice; and decode the choice and act on it.

Some menus (as we will see later) are graphic and rely on specific keypresses. In this case the approach is to: allow the user to press any keys; change the item on the menu whenever a selector key is pressed; and confirm that choice by pressing Return.

Looking at figure 1 we need to identify each area of the program and produce a matching piece of code. In each of the following programs we will use the same four common procedures, representing four major sections of a menu-driven program shown in listing 10. They include PROCs Siren1, Siren2, Siren3 and Phone: we are writing a sound effects menu-driven program.

These four procedures are relatively easy to understand. Sirens 1 and 3 are driven by varying the frequency parameters of envelope 1, while the twin-tone siren 2 is two distinct sound commands. The complex sound pattern of a trimphone is achieved by using four sound commands to sequence the warble created by a new envelope 1. Remember to add these procedures onto the end of each of the menus that you type in. The best way to do this is to enter the procedures and SPOOL them to tape or disc by typing:

```
*SPOOL procs
LIST
*SPOOL
```

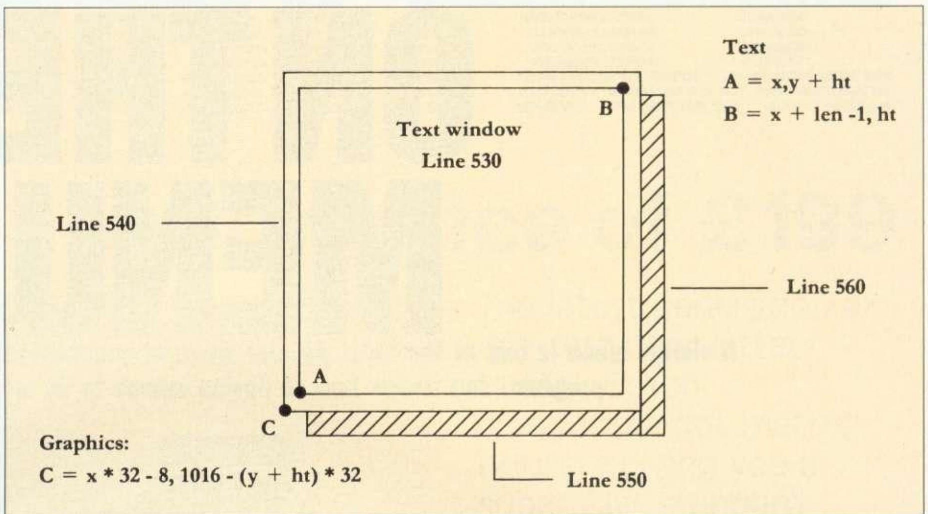
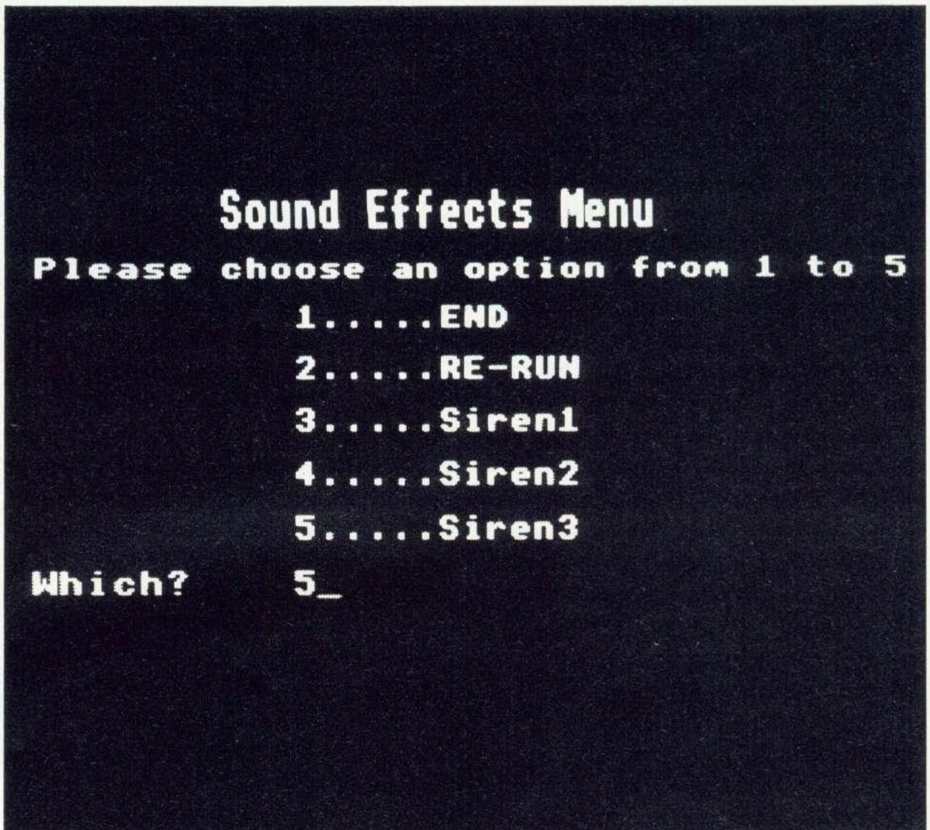


Figure 2. The maths behind the window menu program given in listing 9 on the yellow pages



The simplest type of menu – make your choice by hitting the key for the relevant number

They can be added to the end of another program later by typing:

```
*EXEC procs
```

Although there are four procedures, our menus are all set up for three procedures. If you wish to add the phone sound then you will have to alter the menus given. The idea of this is to give you some gentle homework. However, we will give advice on how to do this as we go along.

Building a simple menu

Let's use figure 1 to write the simplest of all menu programs, which will include a few warts. Notice that the whole program is enclosed within a loop, so we can start off by initiating this loop:

```
80 REPEAT
```

Now figure 1 tells us to display the options available to the user, and we can do this using three lines:

```
90 PRINT'"1...Siren 1"
100 PRINT'"2...Siren 2"
110 PRINT'"3...Siren 3"
```

Gosh, this is easy! The next box in the structures says get the user's choice, and we accomplish this with a single line which demands an input:

```
120 INPUT'"Which? "choice
```

Finally we are expected to decode and process

the number typed. This will take one line of program per option:

130 IF choice = 1 PROCsiren1
140 IF choice = 2 PROCsiren2
150 IF choice = 3 PROCsiren3

Then, finally, we must indicate the end of the loop, and this is done with:

160 UNTIL FALSE

which indicates that the whole thing happens continually. Now just add your four extra procedures and type RUN. Pressing 1 followed by Return should give you Siren 1, pressing 2 and Return will give Siren 2 and pressing 3 and Return will give Siren 3. The complete program is shown again in a tidier form as listing 1 on the yellow pages.

Let's think for a moment. What is tacky about this program? Ask yourself:

- How can we stop the program?
- How can we restart the program? (In a business program, a re-start might be the fastest way to reset the program for another try)
- What happens when we press 0 or −1 or 6 or type garbage?

However, just before we discard menu 1 entirely, remember it might just be something which you would want to use to drive your own programs quickly as an aid to debugging. Let's add a couple of things to improve it.

Listing 2 shows the simple menu upgraded to handle the first two items in our list, and it now makes an attempt at checking the range of the number entered. Notice that each line of the display section (100 to 140) has a corresponding line in the decoding section (lines 170 to 210).

We can now think about adding the Phone option as option 6. But now that we have a range check in the loop from line 90 to 160, we will need to increase the range of choices to greater than 0 and less than 7.

The benefit of putting the menu into a procedure is that the main body of the program becomes shorter and easier to handle. A particular quirk of my mentality is that I only include the display and user input in my procedures. I leave the processing in the main body of the program because I often want to do mode changes and other things which are illegal inside procedures. Look at listing 3 and you will see that it is identical to listing 2, except that the display/input section of listing 2 (lines 90 to 160) is replaced by line 90 ... PROCmenu.

Looking further down the listing we come to DEFPROCmenu at line 170. This contains the code, from listing 2, line for line. The main benefit is one of readability.

The main body of the program is shorter and more easily understandable. The DEFPROCmenu section can be slotted anywhere after the end of the main body.

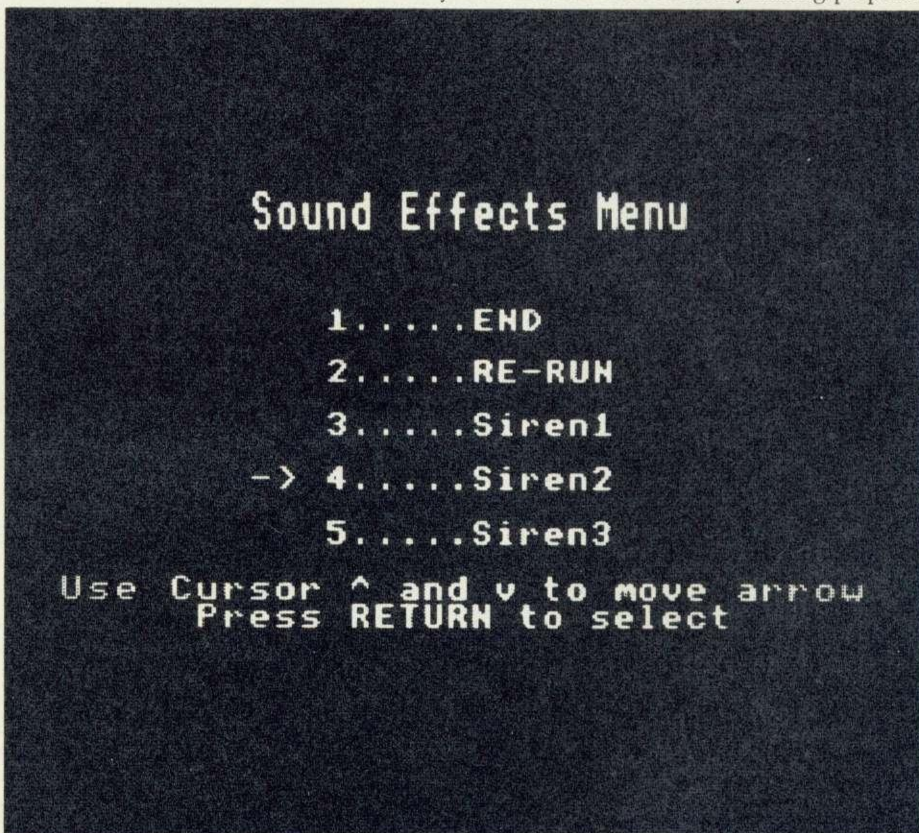
Yet the search for a satisfactory menu cannot stop with procedures. The variable called 'choice' must now be global, ie, it has to exist in the procedure and in the main body of the program, and it should contain identical information in both areas. In a large program containing several menus, this might not be appropriate, and the variable could change value if it is used in two or more different procedures.

What we really need is a means of keeping variables in procedures local to those procedures, but to return a value from the procedure to the main program. This can be done by using functions.

Most of the menus which I use are actually function menus in one form or another. Look at listing 4, for example. The points of interest start with line 90:

90 choice = FNmenu

This indicates that the menu function is returning a value to 'choice' and that choice is only found in the main body of the program. This will make debugging easier. Matching this change is the DEFFNmenu of line 170 and the = choice of line 280. Notice that although the word 'choice' is used in DEFFNmenu it is declared LOCAL by line 180. This means that it is quite separate from the variable 'choice' in the main program. In addition we've added a line 260 which points out the range of numbers which can be input whenever an 'out of range' number is typed.



On this sophisticated menu, the user moves the on-screen arrow with the cursor keys to make a selection

It might be worth coming back to our homework problem of extending an existing menu. To add a 'phone' to menu 4 we must consider the following points:

- Add a process line for option 6 at line 145
- Add a display line for option 6 at line 235
- Alter line 260 to cope with "choice > 6".....
- Alter line 270 to cope with "choice < 7"

Better layout

The choice of layout is not critical if you are dabbling for your own benefit. However, as soon as you extend a program's use to others, then layout and screen design become important. If the program is intended for wide distribution and for money-making purposes, then screen layout will sell more programs than your nifty little matrix manipulation routine, buried in your software.

Listing 5 shows how the screen layout can be improved considerably, but the cost is program size, which always increases as the layout improves. My own approach is to make use of mode 7 for most menus. This is advantageous because controlling teletext graphics uses less program space than the equivalent layout commands for the other modes. Conscious of readers with Electrons, I'll stay in mode 4 and accept the increase in memory usage which this entails. The screen layout is all performed in DEFFNmenu from

line 170 onward. The title is always important and this often looks best if set in double height characters. A routine for handling this in mode 4 is given in DEFPROCdouble.

The double height procedure takes X and Y text co-ordinate positions, and a string of characters to print in double height. If the X parameter is greater than 80 then this signals the procedure to centralise the string across the screen at the Y co-ordinate given. Character doubling is performed by reading the definition of each character in turn using an OSWORD with A% set to 10. Character 128 is then redefined twice, to give the top half of the character and the bottom half. This redefining and printing happens in line 430. The c% variable points to some spare memory from location &71 to &78.

The next most useful improvement is to centralise the menu itself. This is done by using the PRINTTABs of lines 200 to 250. You must decide on the values chosen considering the number of menu lines, and their length. Notice also that the entry section of lines 260 to 300 is much altered. It uses PRINTTABs to define the position of all input on the screen. Notice too that the REPEAT loop of 260 to 300, combined with the INPUTTAB of line 280, means that there will be no movement of the menu on the screen. Line 270 prints a Which? message followed by a string of 20 spaces, which tidy the last input from the user.

General-purpose menu

Now it's time to think about a general-purpose menu routine. Menu 5 starts us on the way by transmitting two parameters in FNmenu(1,5) of line 90. These are decoded as the minimum and maximum acceptable values for the range check, and we can see their action in lines 290 and 300. However, we still have a long way to go to a totally transportable menu.

Using the input command to get the user's choice is fraught with danger. Certainly the program we have introduced in menu 4 is reasonably resistant to typing errors but try typing a long line (greater than the 20 blanking spaces) and see the result – untidy, to say the least. The usual alternatives to INPUT are either GET$ or INKEY$. To make either of these behave like an 'intelligent' INPUT routine would require a special routine which would allow typing and deletion of one or two characters, depending on the number of options available; selection of characters so that only numbers or letters would be accepted as appropriate; and comprehension that the Return key marks the end of INPUT.

Now we must make a difficult decision. Do we try to refine our existing menu to handle this intelligent INPUT, or do we go for an alternative to numerical input? I'll follow the latter path.

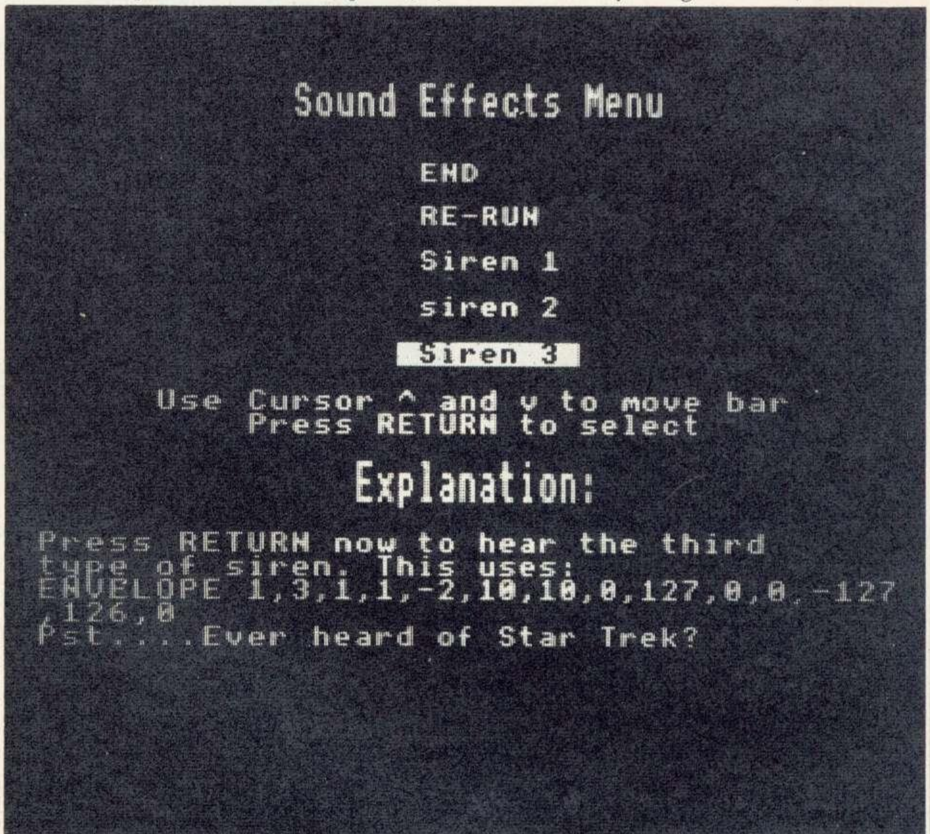
The route which we now follow will lead us to a more user-friendly approach to indicating menu options. Look at listing 6. This is almost identical to listing 5 as far as line 260. After this line we enter a routine which tests for only three keypresses. The Cursor Up key, the Cursor Down key and the Return key. Instead of the 'ch' variable we use a 'menuptr' (menupointer) which indicates the number of the currently selected item. The routine between lines 310 and 370 increments or decrements the value of menuptr depending on which key is pressed. Once the Return key is pressed the current value of menuptr is returned to the main program. Line 320 prints an arrow which points at the current option (→).

cursor keys using the GET command. Lines 380 and 70 both restore the cursor keys to their normal function. Line 70 is a simple error trap, which in repetitive menus is best placed outside the main program loop, so that the effect of Escape is to restart the main loop. However, during debugging I suggest you miss it out until the program is functioning. To improve error trapping, it could be altered to:

70 ON ERROR IF ERR<>17 REPORT:END ELSE *FX4,0

Notice too, the VDU23 commands of lines 110 and 190. These turn the cursor on and off respectively. If they misbehave on your machine just miss them out. Finally, in menu 6 don't forget to add DEFPROCdouble which I have left out for simplicity.

We're really doing well now, but think a



This menu incorporates an explanation of the option you have chosen by moving the bar

Line 330 waits for a keypress, and line 340 deletes the arrow indicator by overprinting it with a couple of spaces. Lines 350 and 360 alter menuptr depending on the keypress. Notice that the last IF statement in each of these lines causes the menuptr to 'wrap' from top to bottom and bottom to top. Users who dislike wrapping can rewrite the lines:

350 IF key=139 menuptr=menuptr−1: IF menuptr=min−1 menuptr=min

360 IF key=138 menuptr=menuptr+1: IF menuptr=max+1 menuptr=max

The following additions to menu 6 also apply to the remaining menu programs. The *FX4,1 of line 290 allows the micro to examine the

moment. How effective an indicator is that little "→" arrow? What we really need is some means of drawing attention to the options in a powerful way. One approach is to highlight the current option by displaying it in reversed colour, ie, black on a white bar. This requires further use of memory.

Look at listing 7. The major alteration here is the approach to the display section. First a list called menu$() is dimensioned for five items (line 70). Next the five items are entered into the list (lines 200 and 240). Notice that they are padded with spaces to make them all the same length to improve presentation. Now the display section and the keypresses are

included in the same loop from lines 300 to 410. The first three lines (310-330) inside this loop are dedicated to printing the menu options, using line 320 to check for the currently selected option, and to set the printing colours accordingly. The weird and wonderful PRINTTAB (16,3+loop%*2) of line 330 is set by the programmer to achieve the required layout of the options. Altering the 16 will alter the horizontal position of the menu on screen. Altering the 3 alters the vertical start position of the menu. Altering the 2 will increase or decrease the gap between options.

Explaining things

Often, particularly when writing a menu which chains programs from a disc, it can be useful if users are given more information than the program title. Such expanded explanations can be achieved by adding an extra procedure to menu 7. If we simply alter line 320 to read:

IF loop% = menuptr PROCexplain (menuptr):COLOUR0:COLOUR129:
ELSE COLOUR1:COLOUR128

then we can call on PROCexplain to expand on each option, below the menu. Listing 8 shows how we can add such a DEFPROCexplain to Menu 7 to get menu 8. Notice how line 490 blanks a suitable area below the menu (240 spaces or six lines) ready for the explanation. To keep the explanations concise we use quite complex PRINT statements involving the '' mark to give line feeds within the single print statement. The other additions to menu 8 are the VDU19 statements of lines 100 and 110. Some would say that these improve the screen colours. Remember that menu 8 also needs DEFPROCdouble.

Homework time again! Adding the phone option to this menu will require us to cope with the following points:

- Adding a line 185 to process the PROCphone
- Alter the dim to allow for menu$(6)
- Alter the FNmenu of line 130 to go up to 6
- Add a line 265 to include menu$(6) = " Phone "
- Add a line 555 to explain the phone (IF m=6 PRINT . . .)

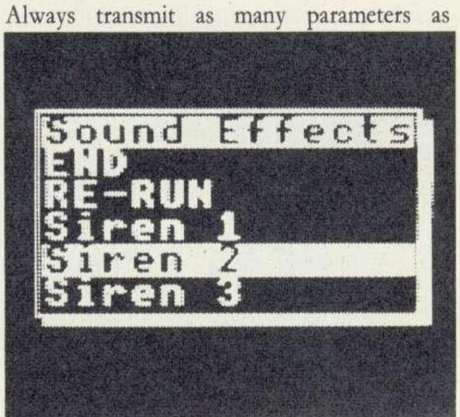
The final stage in our search for the perfect menu takes us closer to the general purpose menu. Of course the user needs to understand the general principles behind windows and 'pop-up' menus. As long as your user can handle the up and down cursor keys and press Return, he or she will be able to drive a menu window. Listing 9 is the window menu program which is configured to handle menus of up to ten displayed items. This is set by the DIM m$(10) at line 70. Notice that the list has been renamed m$() rather than menu$() to save space. The actual window menu is called by line 130:

Choice = FNwmenu("Sound Effects",5, "END","RE-RUN","Siren 1", Siren 2", "Siren 3","","","","","")

Notice that we send 12 parameters to DEFFNwmenu. These include:

Parameter 1: The title of the window
Parameter 2: The number of menu options (say n)
Parameter 3: The 1st menu option string
Parameter 2 + n: The last option string
Parameter 2 + n + 1: The first null string
Parameter 12: The last null string

Always transmit as many parameters as



Dropped shadow box menu

the DEFFN expects to receive. Hence in our example we send the spare options as null strings.

Line 210 receives the 12 parameters and places all the strings into m$(0) . . . m$(10). The number of viable options is received in the variable 'max'. Before any menu display can take place the strings must be measured so that a window can be defined into which they will all fit. This is done in lines 220 to 250. By line 240 the variable 'len' contains the length of the largest string, including the title string. The next stage is to open a window, and this is done by line 280 which calls PROCopenwindow with four parameters. These comprise the text X,Y co-ordinates of the top left of the window, along with the width of the window (len) and the number of lines in the window (max + 1).

DEFPROCopenwindow defines the text window in line 550 and then proceeds to frame it with a graphics rectangle and shadow, which is reminiscent of GEM or Mac type windows. The maths of lines 560 to 580 will work in modes 4 and 1 and is shown in figure 2. These lines can be lost in modes 6 and 3. The 'x*32+8' values will need changing to 'x*16+4' mode 0 and to 'x*64+32' for modes 2 and 5. DEFPROCrect is a straightforward rectangle drawing procedure. Its 'f' parameter is a 'fill' flag and if set to 1 the rectangle is filled, while set to 0, 'f' causes an outline to be drawn.

Once the window is opened, the next stage is to display the menu and this is done by lines 320 to 350. The title line and the current option are highlighted by line 330 but only the current option bar moves.

The choice loop repeats from line 300 to 400 and the window is reprinted on each keypress, with the option bar adjusted if necessary by lines 380 and 390. Note that we have lost our 'min' variable.

Once the Return key has been pressed menuptr is returned to the main program for further processing. Tidiness dictates that the window should be closed, and this is achieved via PROCclosewindow, which after clearing windows with a VDU26 in line 460 proceeds to call PROCopenwindow again, but with the GCOL set to erase the graphics frame. Lines 490, 500 and 510 then clear the window, delete windowing, and reset the normal GCOL0,1 option. Lines 140 to 180 are the standard processing section which we have maintained throughout. Remember that the four effects procedures need loading for this program, but DEFPROCdouble is no longer required.

Updating this program to add additional options is extremely easy, up to the present limit of 10 options. As an example, we can amend the program to handle the trimphone sound by adding:

130 choice = FNwmenu ("Sound Effects", 6, "END", "RE-RUN", "Siren 1", Siren 2", "Siren 3", "Trim Phone", "", "", "", "")
145 IF choice = 6 PROCphone

Notice that the changes to line 130 are the 5 into a 6 and the first null string into a "Trim Phone".

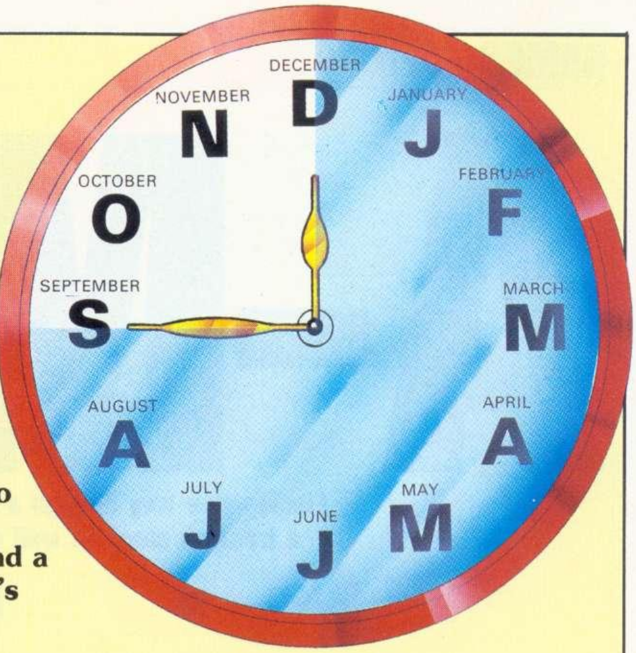
You may want to use one or other of these basic menus to index your discs. The most useful is probably menu 8, which would contain explanations of the various programs on offer. No real alteration to the menu program would be needed, except to include the correct program names with the correct options, eg:

160 IF choice = 3 CHAIN "PROG1"

The way forward probably lies with mouse-driven symbolic menus currently found on the Mac, Atari and the Master 512, and I may well look at them in a future issue.

See the index to the yellow pages on page 113 for details of where to find Joe's listings

Yes – it's bargain-hunting time again!



For BBC Micro and Electron users this is the start of the top buying period of the year – the time when they stock up with all the latest hardware and software that will enhance the versatility, power – and just sheer fun! – of their micros.

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A-MAZE-I

Finding your way through a maze isn't easy, but when you have to find a treasure chest as well as the exit, then you really are in trouble

David Lawrence

Mazes have always been a source of fascination – right back to the ancient Greeks, when Theseus had to kill the Minotaur whose home was a labyrinth. Whether they're drawn on paper or constructed out of hedges, people seem to enjoy following seemingly endless paths and getting progressively and hopelessly lost!

In this game a random maze is generated and you are placed at one edge of it: the aim is to find the treasure and, ultimately, the exit. The maze is drawn as a 3D 'down-the-corridor' projection, so it is quite easy to lose your bearings and wander around aimlessly. However, all is not lost: Theseus had his ball of

Z	– turn 90 degrees left
X	– turn 90 degrees right
/	– about turn (180 degrees)
:	– move one square forward
S	– scan (activate radar)
C	– mark floor with cross
F	– turn wall filling on/off

Table 1. The keys needed to find yo

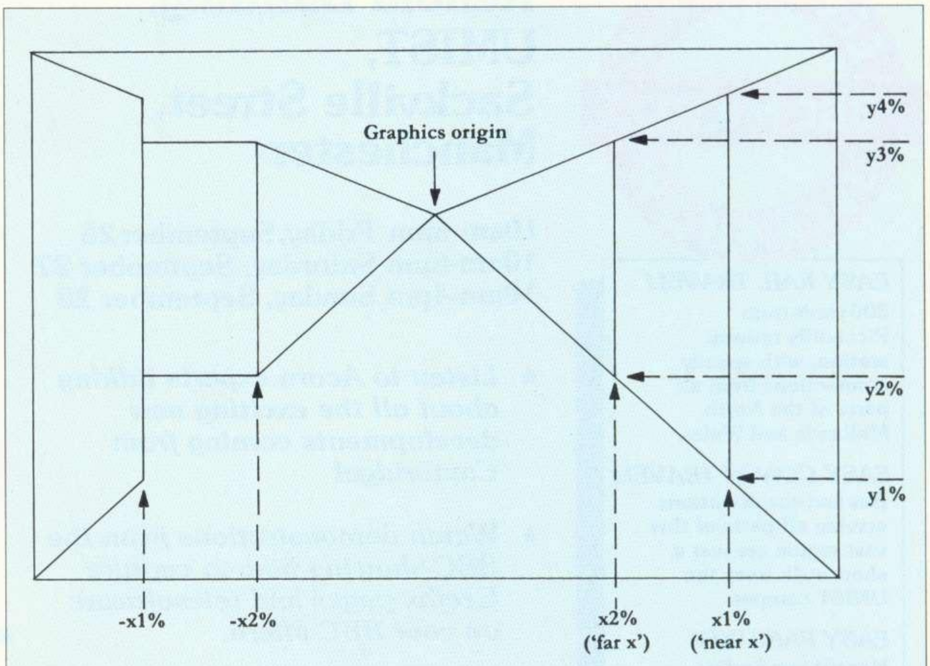


Figure 1. The walls, crosses, etc, can all be drawn in perspective using various X and Y co-ordinates

...ll. Scan activates the radar and shows you a ...rea of the maze with you at the centre. ... because you can only use this option

simple north-south stroll – a box of treasure, which has been randomly placed within the maze, must be found. If you find the exit ...he treasure, you will be told to ...d it.

...es

... drawing is not as hard as it ... An array is needed to store the ... case an area of memory is used ... DIMed array – to cut down on ... memory used. Each location ... e which represents a wall, the ... array can be read by using ... and written to by using ... ,y,a) where x and y are the co- ... point you wish to look at and a ... wish to place at that point.

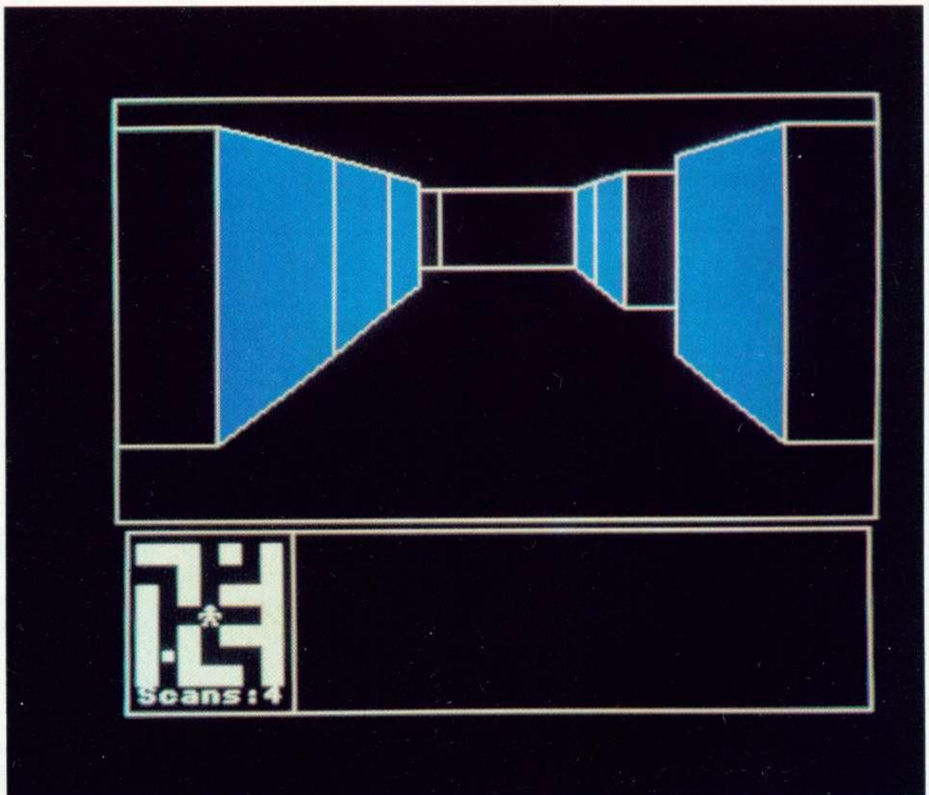
... arts off empty (ie, all wall). A ...) is chosen, as well as a random

-ING



```
.START   Set X,Y
.CHOOSE  Choose a random direction (1-4)
         Calculate new X and Y
         IF new square outside maze,
           goto CHOOSE
         If new square has already been
           visited, goto JUMP
         Make passage from old to new
         Make X and Y equal to new X
           and new Y
         If all squares visited,
           goto END else goto
           CHOOSE
.END     >> END <<
.JUMP    Choose a random square
         If it has not been visited,
           goto JUMP else goto
           CHOOSE
```

Table 2. How a random maze is created



Walls can be coloured in or simple outlines: wall colour can be a navigational aid

direction (1 = up, 2 = left, 3 = down, 4 = right). The array D%(D,j) contains the values which need to be added to the X and Y co-ordinates to move X and Y in direction D (j = 1 for X co-ordinates, 2 for Y co-ordinates). The best way to explain the full procedure is by means of a flow diagram: see table 2.

Although the array used is 20 by 20, the maze construction works on a 10 by 10 grid missing out alternate rows and columns. This means that walls are one block thick. This is done to make the 3D views in perspective easier to draw.

When designed, a random exit, start position and box position are chosen. The maze is then ready for exploration.

Three-dimensional views

A set of X co-ordinates corresponding to positions of the side exits is the only data that needs to be stored – all Y co-ordinates are worked out by proportions.

The procedure view (x,y,d) is the main routine for drawing what you can see. It produces the 3D view for position (x,y) looking in direction (d). It clears the top area of the screen, draws a border and resets the graphic window. It then calls the function 'room (x,y,d,r)' for each 'room' in front of you until it reaches a blank wall. It will also stop if it has drawn 12 rooms and has not found the end of the corridor; this is because it cannot draw in sufficient detail at this distance. The 'r' in FNroom is the element of the maze array for co-ordinate (x,y), ie, a wall, a cross, etc.

The actual drawing is done by the function 'room'. It 'looks' at the room to the left, the one straight ahead and the one to the right and for each one draws the appropriate wall, corridor, cross, etc. Each one of these has its own procedure, eg, PROCsidecross. Function 'room' returns either 0 or N% + 1. A zero indicates that an end wall has been reached and no more drawing should be done. N% indicates how many rooms you can see ahead of you, so, if the function returns N% + 1, a further room can be drawn. The procedures for drawing the walls, crosses, etc, take the two stored X co-ordinates for the current room (the first is the 'near X', the second is the 'far X' co-ordinate) and calculates Y co-ordinates from these proportionally. Any of the items in the maze can then be drawn by using various Xs and Ys as ordered pairs: see figure 1.

When the next furthest room is needed the

CJE micro's

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Multi-Font NLQ is compatible with nearly all software, including most BASIC programs, VIEW, WORDWISE & InterWORD (SCRIBE & Printer Buffer software currently not supported).

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	Gothic	Broadway E.
	CompTS	Theatre

Additional Font Disc MF 'B' contains:-
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For Canon & Taxan Kaga users we recommend FONTAID in preference to Multi-Font NLQ.

Multi-Font NLQ (ROM and 40/80 Disc)	**£30.00**
Additional font disc 'MF-B' (12 fonts)	**£15.00**
P & P on MFNLQ	**£ 1.00**

This is Standard
This is COURIER
This is ITALIC
This is GOTHIC
This is COMPTS
This is BOLD
This is SHADOW
This is OUTLINE
This is BROWAYE
This is THEATRE

EXAMPLE OF MFNLQ FONTS

FONTAID

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Additional disc 'A' gives an extra 11 fonts including:-
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue '*' commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

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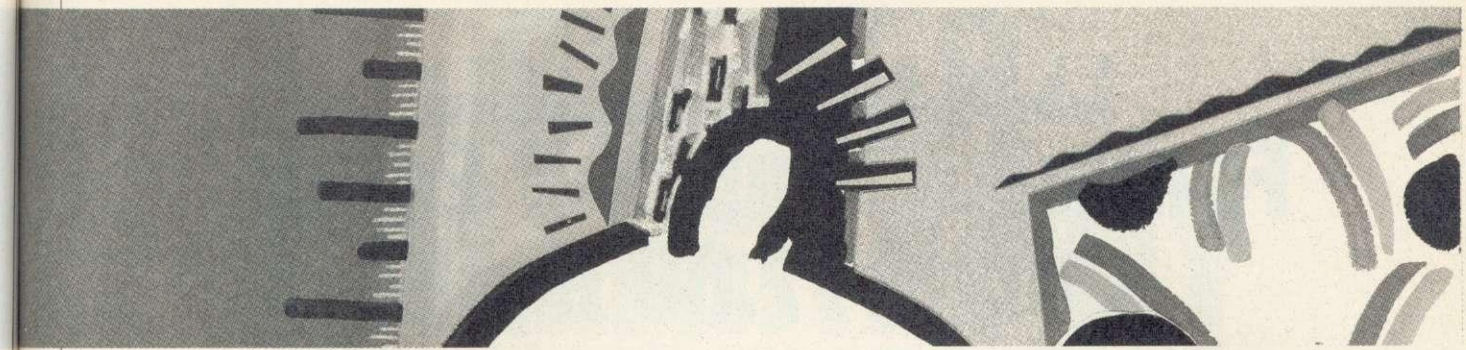
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CJE micro's



PROCreset	Resets screen and flags
PROCmaze	Creates the random maze
PROCgame	The main game procedure
PROVview	Displays maze from given viewpoint
FNroom	Displays single room
PROCside	Shows specified side of room
PROCwall	Shows a solid wall
PROCopen	Shows a side passage
PROCmove	Detects your keypresses and calls the appropriate procedures
FNforward	Checks if it is possible for you to move forward
FNscan	Performs scan of immediate surroundings
PROCreloc	Relocates program down to &1100 if necessary.

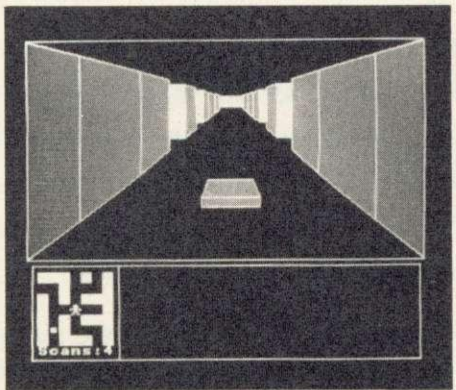
Major procedures and functions

new 'near X' is given the value of the old 'far X' and a new 'far X' is read in. The X coordinates are stored in the array L%(). The walls are coloured using triangles (PLOT 85,x,y). Pressing F simply stops this happening and only the outlines are drawn.

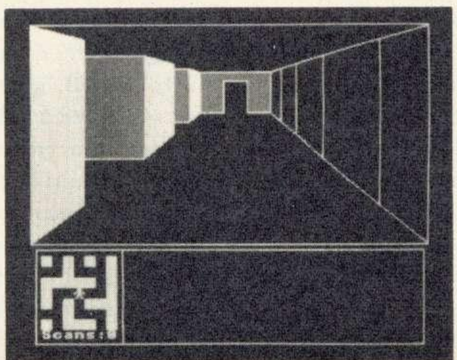
Hints for playing

Many people may know the 'right-hand rule' for finding the way out of a maze. This simply involves placing your right hand on the right hand wall and following this wall round until you get to the exit. This system is fine, and works well, but it does become a bit tedious, especially if you then have to go off and find the treasure!

In this game, the scanner is useful in some situations but, because of its limited range, is not incredibly helpful in others. (Perhaps you may like to extend the range – all the necessaries can be found in 'FNscan'.) Clearly then, the chalk is your most useful aid. I use it to mark corridors that are dead-ends. So if I go down a corridor and find a dead-end, I go back to the last junction and mark the entrance to that corridor with a cross and then go down a different corridor from that junction.



Finding the hidden treasure adds to the puzzle . . .



. . . once you've found it head for the exit

This means that if I come to a junction which has all exits except one 'crossed', then the whole of that area must be a dead-end, so I go down that un-crossed corridor until I get to the next junction. This procedure can then be repeated until all the dead-ends have been 'crossed out'. Finding the exit then is easy. Don't forget that the colour of the walls can help you remember where you are.

Improvements and further suggestions

The maze drawing routine always draws a solvable maze, so there is little room for improvement here. However, the start is always on the top wall and the finish always on the bottom wall, so it possible for you to start at the top of a very long north-south corridor with the exit at the bottom!

A routine to find the two points which are furthest apart (ie, the longest path round the maze) would be useful to position the start and end points. Also, if the treasure could be placed down the longest of the dead-ends, the game could be made harder.

As for further suggestions, the basic maze drawing routine can be used as the basis for many other maze games. I have used it for a basic 2D maze where the walls only appear when you hit them, a dungeon inhabited by nasty monsters (a *Dungeons & Dragons* type game), *Pathfinder* (based on the two-player board game of the same name), a 2D hexagonal maze – the rooms are hexagonal rather than square. I am currently developing a 3D 3D maze, in which you see down corridors as in this game, but the actual maze is constructed within a cube!

Array Value	Item in maze
0	Wall
1	Corridor
2	Cross
3	Treasure box
4	Exit

Table 3. The array elements of FNroom

Acorn User would be interested to hear from anyone who has any further ideas for different maze games.

As a final note, don't forget the chalk, don't get too lost and watch out for the Minotaur!

For David Lawrence's MAZE listing, see the yellow pages index on page 113

FONTWISE

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Just some of the fonts this software makes available

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You need a printer compatible with Epson RX, FX, LX, and capable of single, double, and quad density graphics and double speed dual density. (Look at your printer manual to check this.) *Fontwise Plus* is compatible with: *Wordwise*/+, *View*, *Mini Office II*, and *Edword 2*.

Also on offer this month is the easy-to-use Clares *Fontwise Editor*, for use with *Fontwise Plus* and *Fontwise*, which allows you to edit current fonts or create your own from scratch. An extra bonus is 10 more fonts, included with the *Fontwise Editor*.

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HA25

CLEVER CALLIGRAPHY

This package of programs enables you to design your own ornamental lettering for a dot-matrix printer, with or without a wordprocessor

Mike Turner

This calligraphy program (listing 1 on the yellow pages) uses a dot-matrix printer to print out ornamental lettering in a style which resembles italic script. It can be used for producing letterheads, notices or handbills – for the school play, perhaps – or legible labels for parcels. Because of shortage of space, only the upper-case (ie, capital) letters and a space are included in the program, but later in this feature you'll find some tips on how to go about designing the lower-case letters and additional styles of letter.

The monthly listings cassette and disc each include a more sophisticated version of this program complete with all the lower-case letters and numerals together with the most frequently-used punctuation symbols, as shown in figure 1. The more comprehensive listing also contains procedures which alter the layout of individual letters within words to give a more balanced look to words such as 'Today', 'July' or 'Adjudication'.

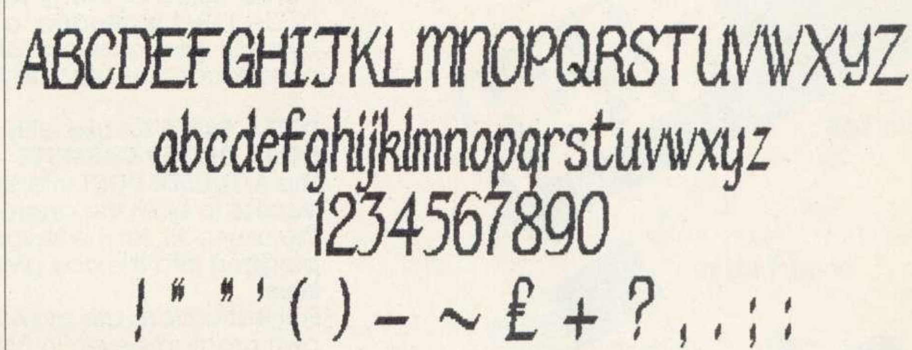
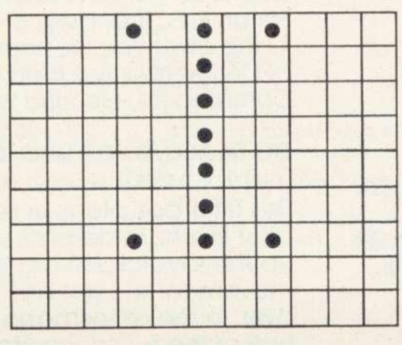


Figure 1. The full set: capitals, lower-case letters, numbers and punctuation



Strikes 1 to 3 are all blank – no wires move.
Strike 4: Wires 1 and 7 hit the paper. All the rest stay still.
Strike 5: No wires move.
Strike 6: Wires 1 to 7 move; 8 and 9 do not.
Strike 7: No wires move.
Strike 8: Only wires 1 and 7 move.
Strikes 9 to 11: No wires move.

Figure 2. How a dot-matrix printer creates a capital 'I'

To use the program you will need to create a file of text to be printed – you can either use *View* or the file-creating program provided here (listing 2).

The layout of each line on the page is controlled by certain control codes – what *View* calls edit commands – and the calligraphy program uses four of these:

- CE, which means 'centre this line'
- RJ, 'print this line so that its last letter appears at the right-hand margin'
- MS, 'make all the spaces between words equal in length'
- LJ, 'set the left edge of the print at the left margin' – this is the default setting.

In listing 2, the file-creating program, you use the Shift or Control keys together with any of the red function keys, followed by the code required and the text, in order to control layout. To print text up against the right-hand side of the print area, for example, type:

Line 1: I'm an Acorn Nut

Line 2: <Shift f0>RJ and I'm out of my tree

This will print as:

I'm an Acorn Nut

and I'm out of my tree

Lines longer than 60 characters prompt a request to try again. Only 22 lines per file are accepted, as this is the maximum contained on an A4 page, but if, for instance, you would like a scroll of ornamental text instead, feel free to modify this.

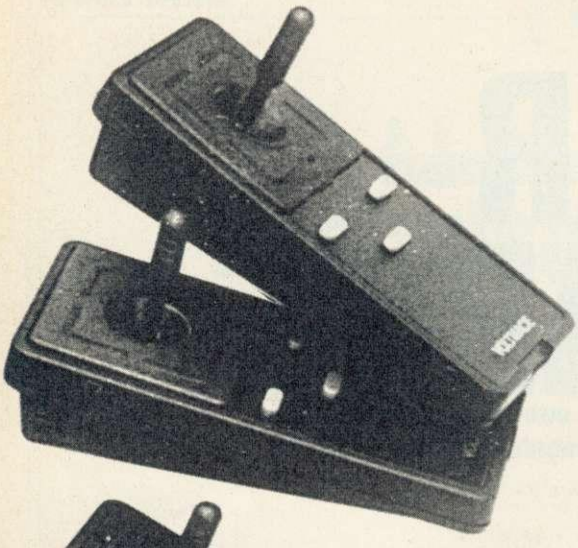
When using *View* a few restrictions need to be observed. Keep the number of characters to a line under a maximum of about 60. Use only the control codes mentioned above. Don't change the default ruler (I use mode 3).

When typing in the main calligraphy program, remember not to renumber the lines containing DATA statements, as otherwise the program will lose track of where to find the data for each letter.

How the printer works

Dot-matrix printers (like my Epson RX80) have a print head with nine fine wires arranged in a vertical column. In the normal text-printing mode, when the printer receives data

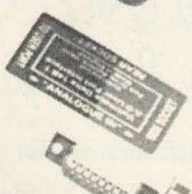
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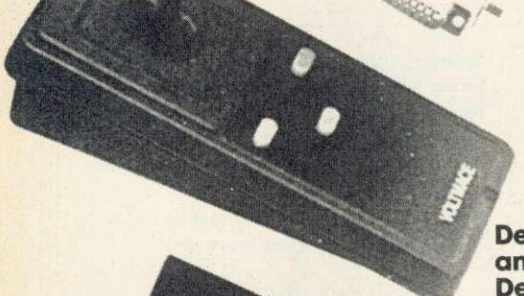
Delta 3B Twin



Delta 14B



Delta 14B/1



Delta 3S and Delta 3B Single



Datapad 16B

DELTA 3B TWIN—BBC B or ELECTRON PLUS 1 £19.95
A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

DELTA 3B SINGLE—BBC B or ELECTRON PLUS 1 £12.00
A single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

DELTA 14B—BBC B £14.95
Our original ACORN/BBC handset. The same super light joystick, but the long life buttons, which have been video game tested for many years, increased to 14 in number. A DELTA 14B/1 is needed to run the keypad but a 14B on its own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA 14B/1 for use with 1 or 2 DELTA 14Bs £14.85
DELTA DRIVER CASSETTE £5.95
The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

DELTA 3S (for ELECTRON with switch joystick interface) £12.00
For an ELECTRON with a switched joystick interface (Not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

DELTA ASC/B FOR BBC, DELTA ASC/E FOR ELECTRON PLUS 1
(not illustrated) **£9.95**
This little box plugs in series with your analogue joystick to alter its characteristics simply by using a switch. In one set up the joystick will act like a switched joystick, i.e. a slight movement will act as if the joystick has been pushed hard over. In the other mode the joystick only covers the centre half of the A/D converter so that it takes twice as much movement to give the same effect. This makes it much easier to make delicate adjustments to programs like flight simulators.

DATAPAD 16B £39.95
A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

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from the computer, it assumes each item is the ASCII code corresponding to a letter, a space, a linefeed, a carriage return, and so on. For instance, if the printer receives the number 73, it goes into a subroutine determined by its manufacturer, and prints out a capital 'I', a column of dots at a time, stepping itself by a tiny amount to the side after each 'strike'. Each standard letter has 11 of these strikes, and for a capital 'I' the sequence is shown in figure 2.

To design the letters used here, I used a printer mode called the 'dual-density bit image' mode. In this mode, if the printer receives the number 73, it doesn't print a capital 'I' at all. Instead the head gives only one strike of the paper, and prints a pattern using only eight of its nine wires, as in figure 3. In fact, if we wanted to produce a replica of our capital 'I' in this mode, we would have to send the printer 11 bytes of data, not just one, like this:

```
10 VDU 2
20 VDU 1, 27, 1, 76, 1, 11, 1, 0
30 FOR strikes=1 TO 11 : READ data :
VDU 1,data : NEXT
40 VDU 3
50 END
60 DATA 0, 0, 0, &82, 0, &FE, 0, &82, 0,
0, 0
```

Line 20 of the above is the command which puts the printer into the dual-density bit image mode. It tells the printer that the next 11 numbers it receives from the computer should be printed as graphics, not text. It is worth talking about this command for a while, as printer manuals tend to be rather inscrutable – figure 4, for instance, shows what mine says on the subject (honest!).

It took me a long time to make any sense of this, but what it means in BBC Basic (if not in BBC English) is that in order to put the printer into the correct frame of mind for a whole line of 960 strikes, first send a VDU2 then this statement:

VDU 1, 27, 1, ASC("L"), 1, n1, 1, n2

where n1 = 960 MOD 256, and n2 = 960 DIV 256, calculated previously.

After this, the printer knows that the next 960 bytes of information it is going to get are graphics characters, and after it has received them it reverts to its normal text mode. Therefore, in the main program we have to set up the printer for graphics at the start of each pass of the head. Also, we need to adjust the line spacing so that we get neither gaps nor overlaps between passes. The distance between the wires on my printer is 1/72 of an inch. We want the second pass to start where the unused ninth wire would have been on the previous one. The manual talks of a code called ESC A, to set line spacing in units of 1/72″; this translates as:

VDU 1, 27, 1, ASC("A"), 1, 8

The last figure is the one representing the number of units needed – there are eight spaces between nine wires.

Once we have the printer in graphics mode, we can build up patterns of strikes for any shape we like, by sending the printer a number for each successive configuration of its print wires. But there's a problem: the eight print wires have 256 possible pattern variations for a single strike, ranging from no wires firing (data = 0) to all wires firing (data = 255) and I for one could never learn them all. Fortunately, the solution really is easy – we need to remember only 16 patterns, which are shown in figure 5. To get a column of eight dots, not four, just double them up (figure 6).

Four passes of the head are needed to build up each line of calligraphic print. The first item in each DATA statement gives the number of strikes for each 'storey' of the letter – succeeding items are strings representing the pattern for each strike.

Figure 7 shows how to derive the DATA statements for the letter 'a'. My alphabet was designed on grids like this, pencilling in and rubbing out squares until each letter looked about right. I suppose I *could* have written an on-screen design program but I could use the paper-and-pencil one on the train. Figure 8 shows how 'G' was produced.

Once you have the shape of a basic letter like a small 'a', you'll find it a help in designing others. For instance, a 'd' is not much more than an 'a' with an upright tail, the tail shapes for a 'y', 'j', 'g' are pretty much the same in terms of dot patterns, if not positioning – the 'j' has a different width – and an 'i' is similar in shape to an 'l'. Also, the curves of the left side of the 'a', 'c', 'd', 'e', 'g', 'o' and 'q' are all very similar. If you feel you haven't the eye for

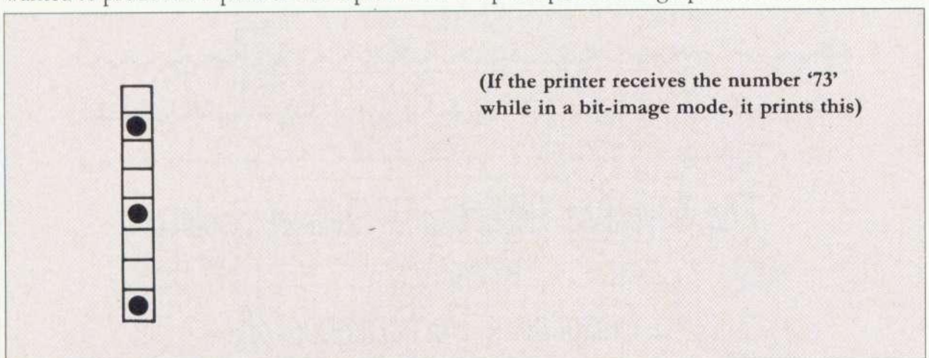


Figure 3. One strike of the paper, using only eight wires

```
Name: ESC L-  Dual-density Bit Image Mode
Expression: CHR$(27);"L";CHR$(n1);CHR$(n2);
CHR$(d1);CHR$(d2);...CHR$(Dn1,n2)          ◄Bit-image data
Function: Sets Dual-density bit image mode. (The maximum
number of bit-image data per line is 960.)
```

Figure 4. The impenetrable prose of the printer manual

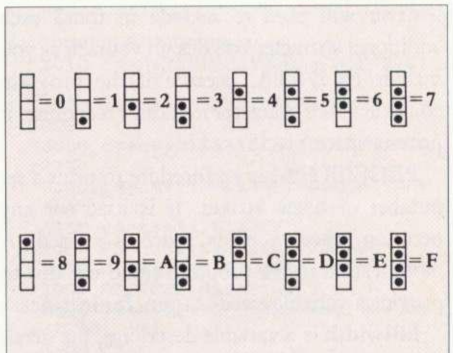


Figure 5. Sixteen patterns to remember

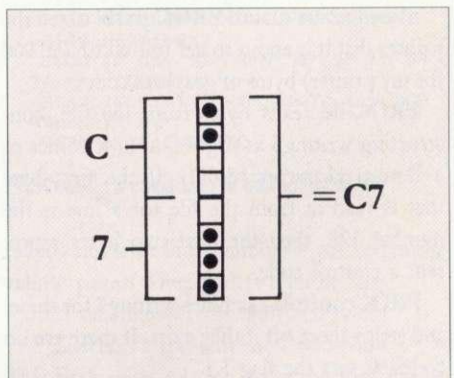


Figure 6. Doubling up for eight dots

designing letters from scratch (like me – I'm still not happy with the 'M' and 'N'), there is an easier way. I subsequently coded another font by using rub-down letters bought from a stationery shop and a photographic enlarger. By sticking the rub-down letters onto a piece of clear film, and projecting this onto a grid of squares – the printer was used to produce this – the outline of each letter was drawn in. If a square looked as though it was more than half covered by the projected shape, it was a 'dot', otherwise it was blank.

Procedures and variables

In general, I have tried to use self-explanatory names for these. For instance, 'font$', in line 100, contains all the letters for which DATA statements have been compiled.

(You will need to include in font$ each additional character you design yourself as you include its DATA, because if the program comes across a character it doesn't recognise, it prints a space.)

PROCfill (j%) is a procedure to print a set number of blank strikes. It is used for any occasion where a blank space is needed. A modification to the program could use this to provide a variable-sized margin, for instance.

fullwidth is a variable describing the maximum number of strikes allowed in the dual-density bit image mode.

n1 and n2 are sent to **PROCgrafix** to tell the printer that it is about to get full-width (ie, 960 for my printer) bytes of graphics codes.

PROCfile reads bytes from the file, constructing writing$ as it goes, until it comes to a Return character (&0D). If the first byte that is read in from the file for a line is the number 128, then the next two bytes represent a control code.

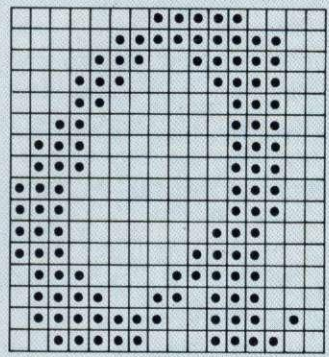
PROCcontrols examines writing$ for these, and strips them off if they exist. If there are no codes, it sets the flag LJ.

PROClayout decides how to respond to the control codes, distributing spaces where needed. It uses the variable 'lead' to decide how many blank strikes are needed at the beginning of the line.

PROCletter chooses which character is due for printing.

PROCcentre counts the number of spaces in writing$ (sp), decides how many strikes (strikes%) are needed to print it, and calculates how many blank strikes (spaces%) are left to fill in each line.

PROCprint reads the DATA, converts the string (dots$) into a hex number (dots%), and sends this to the printer, adjusting the width of space characters if the flag MS is set, and counting the number of head-strikes to keep track of its position on the line.



```
 3170 DATA 16,0,3,7,1F,38,70
,60,C0,C0,E0,F0,FF,7F,7F,0,0
 3180 DATA 16,F0,FE,FF,F,7,3
,3,6,C,18,3F,FF,FF,C1,2,0

"a" is 16 strikes side so
first item in each DATA
statement is therefore 16

For added speed, line number
for first DATA statement for
"a" can be calculated as
50*(ASC"a"-65)+1570 ie, 3170
```

Figure 7. How the DATA statements for the letter 'a' are derived

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

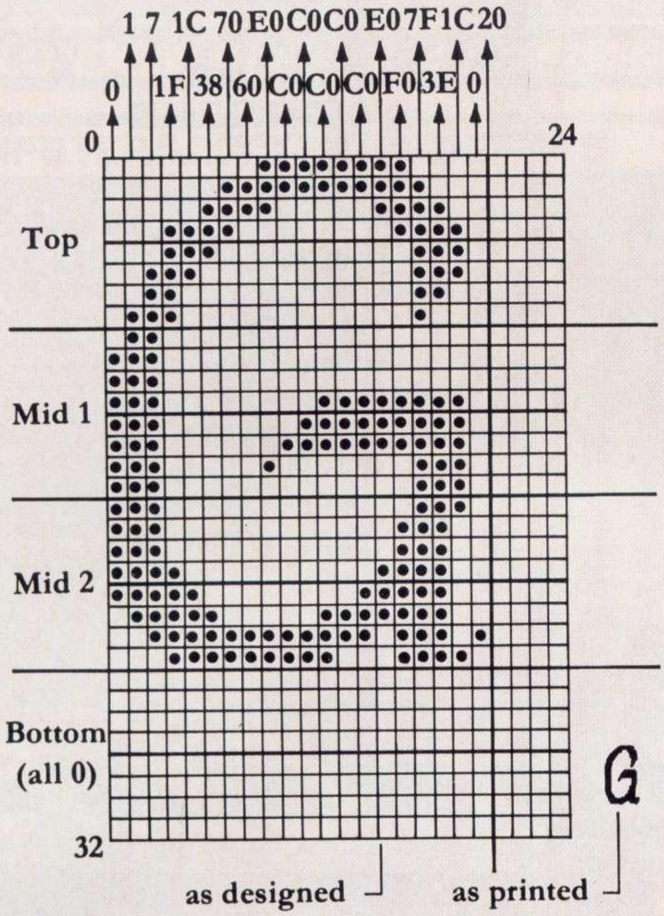
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Handbill printed by the calligraphy program




```
1860 REM G
1870 DATA 20,0,1,7,1F,1C,38,70,60,E0,C0,C0,C0
,C0,C0,E0,F0,7F,3E,1C,0
1880 DATA 20,7F,FF,FF,0,0,0,0,0,2,4,C,1C,1C,1
C,1C,1C,1F,1F,1F,0
1890 DATA 20,F8,FC,FE,1F,F,7,3,3,3,3,3,7,6,E,
1C,7F,FF,FF,81,2
1900 :
```

Binary to hex

After a character has been designed the lines of bytes need to be converted from dots to a number for inclusion in a DATA statement. The 8 dots within each byte provide the binary pattern to make the calculation. For each dot substitute a 1 and for each clear position substitute a 0. So a line composed of 4 dots and 4 clear spaces thus:



would become 00001111 in binary. Converting this into hex is straightforward enough and can be calculated using the following formula:

$(0 \times *128)+(0 \times *64)+(0 \times *32)+(0 \times *16) + (1*8) + (1*4) + (1*2) + (1*1)$

which in turn simplifies to:

$0+0+0+0+8+4+2+1=15$

The result here is in decimal but the program requires it to be in hex format. To convert from decimal to hex use the table below as follows. First treat the binary value as two 4 bit numbers and convert each using the following formula:

$(x \times *8) + (x \times *4) + (x \times *2) + (x \times *1)$

This will give you two numbers in the range 0 to 15. Extract the hex equivalents from the table below and place them together to end with a two digit hex number. Example: Convert 11010001 to hex.

$1101 = (1*8) + (1*4) + (0*2) + (1*1) = 13$

$0001 = (0*8) + (0*4) + (0*2) + (1*1) = 1$

In table 13 = D and 1 = 1 so hex value is D1.

Dec	1	2	3	4	5	6	7	8	9	10
Hex	1	2	3	4	5	6	7	8	9	A
Dec	11	12	13	14	15					
Hex	B	C	D	E	F					

Figure 8. Three-decker design for a capital 'G' and how the hex DATA figures are derived

Speeding-up Calligraphy

The version of Mike Turner's Calligraphy program published in the yellow pages is the 'legal' version. That is, although the listing is presented with line numbers starting with 10 and going up in steps of 10, once entered, the program could be renumbered without affecting its operation. The disadvantage of using this version is that it can be quite slow, but the program can be speeded-up considerably by using a little 'illegal' trick.

To find the data for a particular letter, the program currently reads each item of data before the required line. It would be much quicker to use BBC Basic's RESTORE command to jump to the required line and this can be done with a little care.

It is vital that you enter the listing with exactly the same line numbers as printed in the yellow pages. Then add two extra lines:

1321 dataline=1570+50*(char%-65)

1322 RESTORE dataline:ENDPROC

This trick relies on two facts: the first line of data for the character 'A' must be located on line 1570 and the difference in line numbers between letters must be constant at 50. If these facts are true, the trick will work and the program will run considerably faster.

```
3000 DEF PROCcheck
3010 c$="121318D210501A751B4B1C1
F"
3020 c$=c$+'12B5126D0F8D171D0FD4
0881"
3030 c$=c$+"1EB415FA153513791A50
1773"
3040 c$=c$+"12A2190F10580C6715DE
116A"
3050 c$=c$+"11511 3FF"
3060 FOR char%=ASC"A" TO ASC"Z"
3070 dataline=1570+50*(char%-65)
3080 RESTORE dataline
3090 T%=EVAL("&"+MID$(c$,1+4*(ch
ar%-65),4))
3100 C%=0
3110 FOR L%=1 TO 3:READ W%:C%=C%
+W%
3120 FOR B%=1 TO W%
3130 READ d$:C%=C%+EVAL("&"+d$)
3140 NEXT:NEXT
3150 IF C%<>T% PRINT"Error in DA
TA for "CHR$char%
3160 IF C%=T% PRINT"DATA for "CH
R$char%" OK"
3170 NEXT:ENDPROC
```

PROCcheck: a checksum to add to listing 1

Checking errors

Because of the considerable amount of data included in the program, a checksum procedure has been devised (above). Enter listing 1, save it and then add PROCcheck. To check your data, type PROCcheck <Return> and any errors found will be reported. It is important that you enter the listing with the same line numbers as printed.

David Acton

For the Calligraphy and Filer listings, see the yellow pages index on page 113

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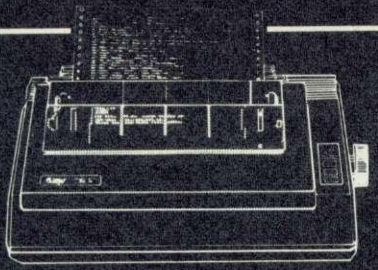
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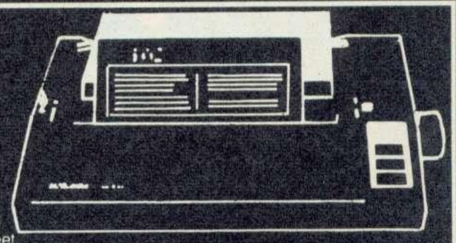
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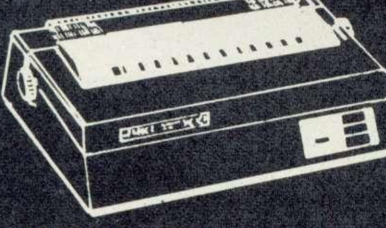
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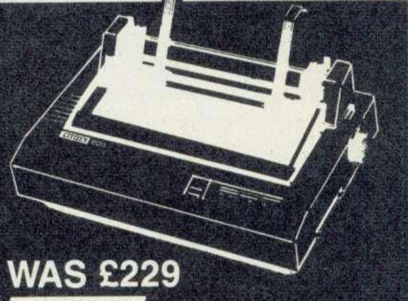
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FILE IT SIDEWAYS

Beat the 31 files per disc catalogue barrier by using the BBC micro's little-known ROM Filing System

Mike Rawlings

In the March '86 issue of *Acorn User* I looked at the sideways answer to data storage space problems: this month there's more lateral thinking on running longer-than-normal programs, loading disc-based programs at &E00 without a downloader and beating the 31 filenames per disc catalogue barrier.

All this and much more can be achieved using the BBC micro's ROM Filing System, a much under-mentioned and little-used facility. Any file that can be saved on disc or cassette can be stored on a ROM or in ROM-format using sideways RAM. Listing 1 on the yellow pages loads your programs or files, scrambles them into ROM format, stores them in sideways RAM and then (as an encore) downloads them and saves them to disc or cassette. They can then be loaded directly into sideways RAM as and when needed.

Before delving into details of how the Romfile program works and, more important, the best way of using it, a few words on the ROM Filing System.

The ROM Filing System is a close relative of the cassette filing system with a few commands borrowed from the disc filing system. Like the cassette system it has a default page value of &E00 and files are stored in data blocks complete with header blocks, both followed by two bytes containing the Cyclic Redundancy Check (CRC), used for checking for corruption during loading. In addition, all this has to be preceded by the ROM header code – a machine code program that tells the operating system what kind of ROM it is, and which carries out all the boring tasks such as displaying *HELP messages, pointers to where file data is stored and much more. The ROM Filing System does not, of course, support save routines – hence the need for this program. Commands borrowed from the disc system are *TYPE, *LIST and *DUMP – the last uses the normal disc buffer at &E00. These three commands only exist if the DFS is fitted. Lastly *CAT will, if preceded by *OPT1,2, give full load and execution addresses together with file length.

ILLUSTRATION BY JIM MAWTUS

The Romfile program

Those impatient to put all this into practice can skip this section and start typing immediately. The program produces a Romfile very speedily without the need to understand how it works. For those with more patience, read on.

Probably the best way to explain how the program works is to proceed in running order. First, PROCass assembles three machine code utilities; the first assembled at &70, is a string input routine (using OSWORD with A=0) called from FNinput(x) at line 3540. This limits the length of the input string to x characters. The second (CRC) calculates the Cyclic Redundancy Check with address of data stored at &8B/&8C, length of data at &8F and returns the CRC high byte at &8E, low byte at &8D. At the end of each header or data block the high byte comes first. The third routine (read/write) is used both for storing code and data in sideways RAM and for downloading the finished Romfile ready for saving.

After prompting the user for a Romfile title and asking how much sideways RAM is available, we come to PROCromsetup. This assembles the ROM header code at &3400 and then uses the read/write routine to store the assembled code in sideways RAM. This header code includes the following routines: general *HELP message (help 1), detailed *HELP message (help 2), pointer to start of first file (file), access data (byte), and display message on Break (boot).

PROCmemleft calculates and displays, not the amount of sideways RAM left after the header code, but the largest program that can be stored in this memory allowing for header blocks, CRCs and block separaters. The first file to be stored in ROM format is then *LOADed at &3400 ready for encoding by PROCencode. Note the addresses read in from PROCrdaddr at line 530. PROCencode assembles the encoded file in sideways RAM in the format described in chapter 35 of the *User Guide* with two exceptions. First, header blocks are used before the first and last data blocks only, all other blocks being separated by a single byte containing the value &23. Second, the four spare bytes at the end of the header block contain the address of the first free byte after the file, to help in fast file searches.

The process of *LOADing and encoding is repeated as often as available RAM allows – there is not restriction on the number of files that can be stored on a Romfile. Lastly the end of ROM marker (&2B) is stored in the first free byte after the last file. The completed Romfile is then downloaded to &3400 using read/write and *SAVEd. Note that the reload address is &FFFF8000 and not &8000; this is to make the Romfile tube-compatible. The prefix FFFF tells the filing system that the file load address is in the I/O processor, and ensures that it will load correctly with the second processor in use.

Using the program

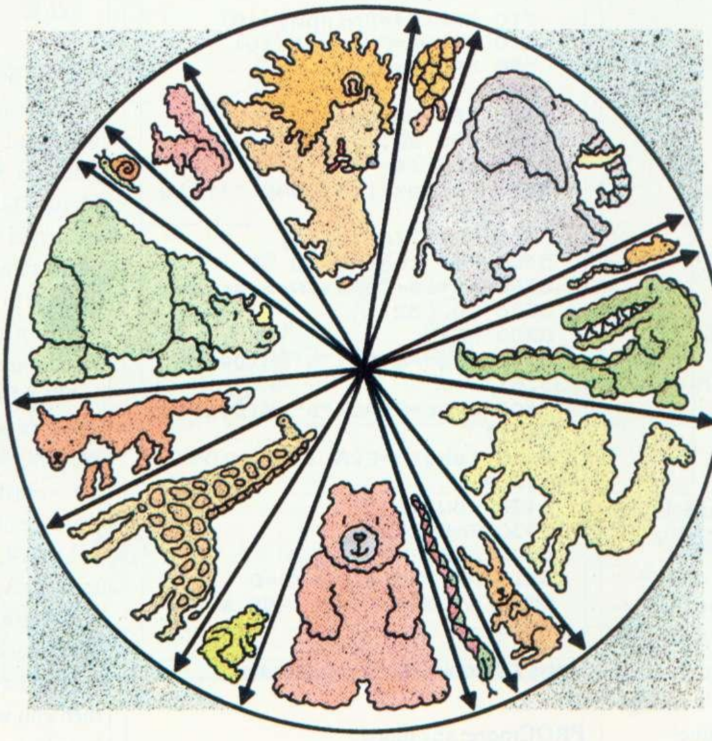
When the program is run you will be asked for the number of your ROM socket containing sideways RAM, and then a 'Romfile Title' – this is used not only as the name to be displayed on pressing Break but also the filename for saving the completed Romfile to disc or tape. Next enter the size of your sideways RAM (8 or 16). You will now see the maximum filelength displayed at the top of the screen, and you can enter the name of your first file to be stored on the Romfile. It is wise to make a note of the length of files to be stored in advance, to avoid the 'This file is too long'

message. On pressing <Return> the file will be loaded from cassette or disc and then a display will count down the blocks being saved into sideways RAM. If you answer Y to the 'any more' prompt the new maximum filelength will be displayed and you can repeat the process until there is insufficient room for more. Typing N instead will save the completed Romfile – have a blank tape or disc ready.

Using the Romfile

Having saved the Romfile you can reload it into sideways RAM with *RLOAD if you have *Acorn User's* UserRAM. With Solidisk and some other systems you should *LOAD <filename> followed by <Break>, or just *<filename> (bank 15 only). To access the files stored on your Romfile type *ROM <Return>, to select the ROM Filing System, then LOAD, *LOAD, CHAIN, *RUN, *CAT, etc, as usual. As mentioned above, the ROM Filing System works quite happily with PAGE set at &E00, so disc users can load and run programs directly at this address without the need for slow downloader routines.

The number of files that can be stored on one Romfile is limited only by the available sideways RAM, so it is possible to save as many files in Romfile format on disc as there is available memory. The largest file that can be stored on an 8k sideways RAM is 7.42k, and on a 16k RAM, 15.33k. Even using double density systems memory will run out well before you get the dreaded 'catalogue full' message.



Running long programs

Using the Romfile system, text and Basic subroutines can be shifted into sideways RAM. First subroutines – any number of these can be stored in sideways RAM and *LOADed as needed. The speed and ease of use of the ROM Filing System makes the technique of appending program blocks practical for cassette users.

The easiest way to demonstrate the technique is to store two small subroutines on a Romfile and then *LOAD them in turn. First type this short program:

```
10 PRINT"SUBROUTINE 1"
20 PROCtest
30 PAGE=&1900:RETURN
```

Then save it under the name "SUB1". Next change line 10 to:

```
10 PRINT"SUBROUTINE 2"
```

and save the result under the name "SUB2". Now use the Romfile listing to store these two subroutines on a Romfile called "SUBS". Now type:

```
PAGE=&1900 <Return>
NEW <Return>
```

and enter listing 2 on the yellow pages, save as "MAIN" and then run. You should see:

```
SUBROUTINE 1
PAGE=&1100
SUBROUTINE 2
PAGE=&1100
MAIN PROGRAM
PAGE=&1900
>
```

Note that the load address of the subroutines in this example is &1100 – this is so that on exit from the subroutine the Disc Filing System will still operate normally. Using lower addresses will cause a 'fatal error' when you next try to access a disc. However, this still leaves a maximum subroutine size of 2k. On no account try to access disc files from subroutines loaded at these addresses.

Larger subroutines can be *LOADed below the main program by loading the main program at a higher page setting. Alternatively a space can be allocated for the subroutines above the main program by setting LOMEM to a value higher than TOP. For example, make the following alterations to "MAIN" (listing 2):

```
5 LOMEM=&2800
150 PROCoscli("LOAD "+a$+" 2000")
170 PAGE=&2000
```

The subroutine space has been allocated between &2000 and &2800 and will work as before providing that TOP is lower than &2000.

The other option is to lower HIMEM and load the subroutines above HIMEM:

```
5 HIMEM=&2800
150 PROCoscli("LOAD "+A$+" 2800")
170 PAGE=&2800
```

This is probably the safest option as there is no chance of the subroutine corrupting variable or program memory.

Any procedures or functions in the main program can be called from these subroutines providing they are initialised first (line 20). Subroutines in the main program can also be used providing you reset PAGE before and after the GOSUB command:

```
PAGE=&2800:GOSUB200:
PAGE=&1900
```

Finally text – if you use the Disc Filing System and your programs contain a great deal of text, you can *BUILD a textfile or better still use *Wordwise* or *View* to create a spooled file, then store this on a Romfile. The text can then be called up from sideways RAM using the *TYPE command. This technique shortens the Basic program by more than the length of the textfile as all the Basic commands used to print the text are dispensed with. I use this method mostly for displaying menus in multi-menu programs and I occasionally *LOAD complete screen displays from sideways RAM.

There is no reason why text files and subroutines cannot be combined on one Romfile, and also no reason why the memory above the Romfile cannot be used for data storage using the programs given in March's article. The next free address can be found by typing PRINT P% immediately after the Romfile has been saved.

I will finish with a pair of short auto-loader programs (listings 3 and 4) that will *LOAD the Romfile "SUBS" into bank 14 and then CHAIN the program "MAIN".

Entering the program

Type in as listed with PAGE set at &1200 then save. If the program is RUN at a higher PAGE setting, it will automatically relocate itself to &1200. So it saves time if you set PAGE=&1200 before running.

Checksum values

The program incorporates its own checksum routine. To test this, after first saving the program, RUN it, entering "TEST123" as the

'Romfile title'. (The ROM size doesn't matter.) The program will report back whether the code has been entered correctly or not.

Testing the program

Carry out the example of appending programs, ie, create a Romfile called "SUBS" made up of "SUB1" and "SUB2". Answer '8' to the question '8k or 16k RAM' – the maximum filelength displayed should be &1DBC.

After loading and encoding "SUB1", the maximum filelength ought to be &1D76 (providing the filelength of "SUB1" is &2B). Answer 'N' after loading and encoding "SUB2", press <space> and after "SUBS" has been saved answer 'N'. This will cause a soft reset and you should see the following display:

BBC Computer
Romfile: SUBS
Acorn DFS (if fitted)
BASIC

Now type:

*ROM <Return>
*CAT <Return>

and you should see the programs stored on the Romfile listed:

SUB1
SUB2

Now type LOAD"SUB1" <Return> and then LIST <Return>.

Possible errors

'Bad ROM': there is an error in the ROM header code – check PROCromsetup.

'Data?': there is an error in PROCencode – probably "search" has been calculated incorrectly – or the values poked into !&8B and ?&8F were incorrect before CALLcrc.

Or why not send for this month's listings disc or cassette and get it right first time?

Program notes

Cassette or ADFS users should alter lines 310 and 510 to:

310 title$=FNinput(10)
510 file$=FNinput(10)

The program has been tested on both *Acorn User*'s UserRAM, the BBC B+128, the Master and on a Solidisk system and should work with others. Those readers with UserRAM fitted should enter the appropriate ROM bank number; Solidisk users should use 15.

Procedures and functions

PROCromestup: assembles ROM header code
PROCass: assembles controlled input routine, 'crc' routine, and 'read/write' routine
FNinput(x): calls controlled input routine and returns string at &C00
PROCmemleft: calculates maximum filelength that can be stored in remaining memory
PROCencode: encodes the file loaded at &3400 in ROM format
PROChblock: assembles header block without CRC
PROCheader: assembles header block with CRC
PROsave: downloads finished Romfile to &3400 and then saves it
PROCequb(n): sideways version of EQUB
PROCequw(n): sideways version of EQUW
PROCequd(n): sideways version of EQUD
PROCequs(n$): sideways version of EQUS
PROCoscli(n$): Basic 1 version of OSCLI

```
 310 title$=FNinput(10)
 510 file$=FNinput(10)
 520 PROCtape
 530
5300 DEF PROCtape
5310 VDU 28,0,8,39,6
5320 CLS:i$=""
5330 PROCoscli("LOAD "+file
$+" 3400")
5340 PRINTTAB(0,1);
5350 FOR char=0 TO 39
5360 i$=i$+CHR$(FNreadchar)
5370 VDU 32
5380 NEXT
5390 load=EVAL("&"+MID$(i$,
23,8))
5400 exec=EVAL("&"+MID$(i$,
32,8))
5410 length=EVAL("&"+MID$(i
$,15,4))
5420 VDU 26
5430 ENDPROC
5500 DEF FNreadchar
5510 A%=135:X%=0:Y%=0
5520 =(USR(&FFF4) AND &FF00
)/256
```

Listing 2. Amendments for cassette users

PROCmore: any more?
PROCsetequ: sets up parameters for sideways equ PROCs
PROCrdaddr: calculates the file's addresses
PROCreloc: relocating routine.

Variables

title$: Romfile title
rom: size of available sideways RAM
memleft: maximum filelength
file$: filename of file to be encoded
load: load address of file to be encoded
exec: execution address of file to be loaded
length: length of file to be loaded
search: address of first free byte after file being encoded
block: number of data block being encoded
address: address of data being encoded
flag: header block flag
blen: length of data block being encoded
bk: sideways bank number
hcrc: crc high byte
lcrc: crc low byte
control%: parameter block to find file addresses

Romfile listing

Romfile contains both Basic and assembly language sections which need to be entered with care. The listed program will work on a disc based BBC B with sideways RAM, the BBC B+ with sideways RAM, the BBC B+ 128k and Master 128k. Details for conversion to tape based systems follow. Once entered, save to disc (tape) and reload after first setting page to &1200 with:

PAGE=&1200
NEW

SRAM details

For use on any of the above machines you will need to input the location of your sideways RAM block. For example on the Master 128 the sideways RAM banks are located in slots 4, 5, 6, and 7 and the desired value should be entered when you are requested to do so. If you are in any doubt as to which of the sideways RAM banks are free then typing

*ROMS

will give you a list of the ROMs present. On the BBC B+128, the sideways RAM banks are normally referred to as W, X, Y and Z – these are effectively mapped like the Master's as banks 4, 5, 6, and 7 and should be selected as such. Again *ROMS will list the contents of RAM/ROM banks if you are in any doubt as to which are free.

If you are using a BBC B or BBC B+64k then you will have a third party RAM/ROM board in operation. Most multi-ROM boards have the RAM/ROM sockets numbered on them or provide details of socket numbers in the accompanying manual. These should be entered accordingly.

Sideways RAM modules such as the *Acorn User* UserRam fit into a single socket: again refer to the manual to ascertain in which socket the RAM module is located.

Tape users

Listing 2 on this page contains the changes which will need to be made to the program before it will work on a tape based system. These allow the tape catalogue details concerning length, load and execution addresses to be read from the screen after the tape file has loaded. Note: line 530 should be deleted.

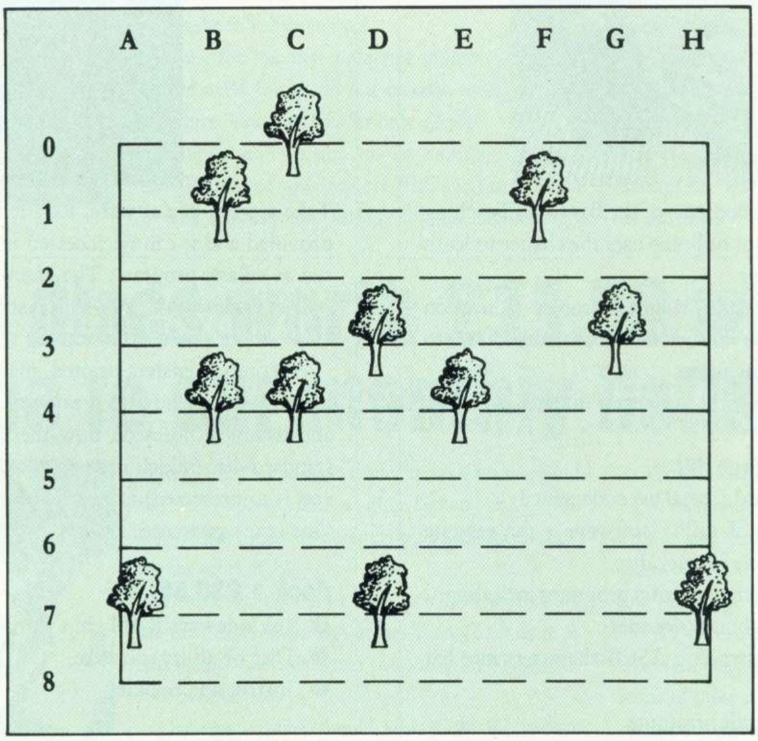
Yellow Pages: Mike Rawlings' listings are on the yellow pages. *See the index on page 113*

COMPETITION

A RAM IN SHEEP'S CLOTHING

Pen your rams and win some ROMs: there's great software to be won for this month's brainteaser

Simon Dally



The illustration above shows an open field dotted with trees. You have eleven rams and you wish each of them to have its own enclosure, each with a tree for shelter. You must find the minimum number of fences that are needed to be built to achieve this, bearing in mind the following:

a) All fences must be straight;

b) Grid numbers are for reference only – a fence may begin and end anywhere;

c) Fences may, of course, cross one another.

Draw your fences with a ruler and pen on the diagram and cut it out. Send it, together with your name and address to September Competition, Acorn User, 141-143 Drury Lane, London WC2B 5TF to arrive not later than 22 September.

A photocopy will do if you don't want to cut your magazine, but you must attach the coupon from the foot of the page with your entry.

Clares MICRO SUPPLIES

Win two ROMs and two discs from Clares

The senders of the first five correct entries drawn out of the hat will each receive an exciting pack of Clares software.

There are two ROMs and two discs in the package. *BROM PLUS* is one of the most popular toolkit ROMs around, adding a host of extra commands to your micro to make life easier, including a full screen editor, finding strings or keywords, search and replace and much more. *MACROM* is a fast macro assembler ROM that allows the use of macros, loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc.

Fontwise Plus (on disc) brings you proportional and justified text in 12 different fonts. It's compatible with *View, Wordwise* and *Wordwise Plus*. Finally, Clares *Fontwise Editor* disc allows you to design your own fonts for personalised printing.

The whole package would normally cost £114.50 but you can win one free if you draw those fences in the right place!

ACORN USER COMPETITION SEPTEMBER

BAR CODE

ACORN USER

Bar code reader teaching pack



Illustrated above are some of the contents of the Bar Code Teaching Pack, designed to give the student or home user the chance to learn about and use bar code technology.

The pack was developed by the Microelectronics Education Programme (MEP) and Addison-Wesley and is available direct to readers of *Acorn User*. The pack includes:

- the bar code reader – which connects directly to your microcomputer
- a user manual written by George Hill
- software to print bar codes and a metal bar code stencil
- a 40-track disc or cassette of utility software – the cassette software can be transferred to 40 or 80 track disc.

The software includes some demonstration programs including:

- using the bar code reader as a binary decoder
- the TELEPEN system for encoding ASCII characters into bar code
- reading programs from bar code printouts
- reading EAN codes at supermarkets checkouts

Also included is a printer driver routine to print out bar-coded listings from Basic.

The total pack costs £83.84 inc VAT and £2.95 postage (£72.90 exc VAT).

Please send me: __________ Bar Code Reader Teaching Packs at £83.84 each inclusive

☐ 40 track disc ☐ or cassette

I enclose cheque/postal order made payable to Redwood Publishing for £ __________

NAME

ADDRESS

POSTCODE

SIGNED DATE 106-9

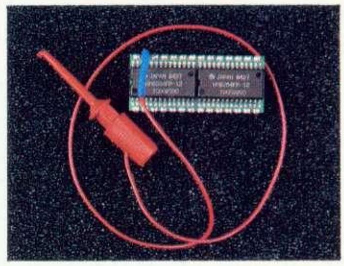
Send this form with your remittance to: **Bar Code Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF** HA22

USERRAM

ACORN USER

Easy-fit sideways RAM at easy prices!

● 16k ● Fully-compatible with BBC B/B+ ● Backed by *Acorn User* ● 3 minutes to fit ● Disc Simple for schools ● Ideal for Econet



Take a piece of software, load it in UserRAM using the utilities provided and it can be accessed instantly using a '*' command or run as a Basic program. The *Acorn User* UserRAM is as easy to install as a sideways ROM, with just one lead to clip on to the leg of a chip – there's no need to unplug the chip.

A comprehensive printed manual gives fitting instructions, information on how to create your own sideways RAM software and technical notes on how the utilities provided work. Also, a standard disc (which runs on 40 and 80 track drives with any DFS and is unprotected) is supplied with all the basic utilities needed. One year's guarantee is given, with postage and VAT included.

Pack 1 £38.50

- 16k sideways RAM chip with attached connecting lead.
- Disc of utility software.
- Instruction booklet.

Pack 2 £57.95 also contains

- 19 new utilities including printer buffer, *FORMAT and *VERIFY for discs, ROM auto boot, two OS calls and more.
- *BBC Micro ROM Book* by Bruce Smith (published by Collins at £9.95).

☐ Please send me __________ copies of pack 1 at £38.50 each

☐ Please send me __________ copies of pack 2 at £57.95 each

I enclose a cheque/postal order made payable to Frondwood Ltd for £ __________

Please debit my Access card A/c No Expiry date

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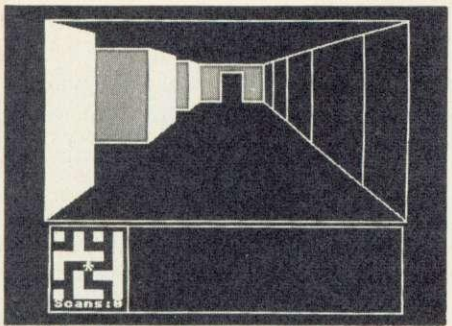
SIGNED DATE

Fill in this coupon and send it (or a copy) with your remittance to: **UserRAM, Acorn User, 141-143 Drury Lane, London WC2B 5TF.** HA23

PROGRAM LISTINGS

ACORN USER OFFERS

September listings on cassette £3.95 or disc £5.95



You'll find Maze on the disc and tape

We're featuring three great programs this month: Mike Rawlings' super new sideways RAM utility, David Lawrence's addictive Maze game and Mike Turner's exciting calligraphy program which supports the full character set.

Plus, for the first time this month, there is an added extra for all of you cassette users – a great graphics bonus, and all for only £3.95.

The cassette version of the monthly listings is suitable for use with both the BBC and the Electron.

The monthly disc listings contain our new-style index and header, and some more graphics screens, a bargain at £5.95.

The discs are supplied in 5.25in 40-track format, and conversion instructions are included for 80-track users. And Electron owners – remember the monthly disc is fully compatible with the advanced Plus 4.

Finally, if you subscribe to the Micronet service, don't forget that you can download the month's disc listings for just £5.00, and you'll avoid the vagaries of the post!

Two free discs worth £11.50 when you subscribe to our monthly listings disc



Digitised portraits in the graphics bonus

Hurry – this is your last chance to take advantage of this really special offer, as after September 30, 1986 we will not be able to accept applications for 14 discs for the price of 12.

Take advantage now and you will receive 14 monthly discs of listings at less than £5.00 each. A real saving, but only when you subscribe before this special offer ends.

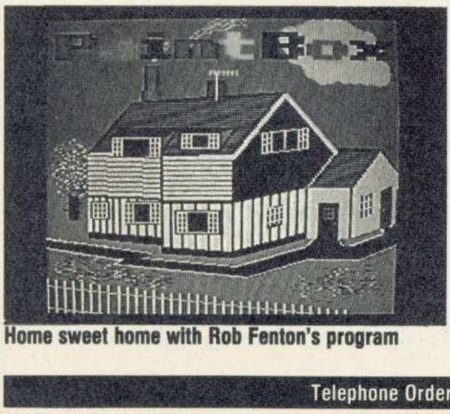
Overseas readers should add £7.00 for surface mail (and airmail to Europe), or £15.00 for airmail delivery (to the rest of the world).

The discs contain all the program listings presented in each issue of *Acorn User*, so you don't have to type in the listings from the yellow pages – which saves you time, as well as money. Just load the disc and off you go.

Plus there's an added bonus – each month the discs contain exciting graphics screens, including some of those featured in the magazine. You can see one of these graphics screens pictured to the left.

Back issues of the monthly disc are available from October 1985.

Free cassettes worth £7.90 when you subscribe to our cassette listings



Home sweet home with Rob Fenton's program

This is your last chance to receive a free Graphics cassette and a Best of Acorn User cassette when you subscribe to our monthly listings cassettes, as this offer closes on September 30, 1986.

Our cassette will save you the time and trouble of keying in our monthly listings from the yellow pages, leaving you free to get on and enjoy the month's programs.

And, don't forget, our offer will also give you the time to enjoy your free cassettes.

The Graphics cassette includes: Rob Fenton's painting program; designing sprites, written by Harry Sinclair; using the colfill and dotfill routines to colour fill, written by Peter Sandford. And what could be more useful than the pie and bar charts also written by Peter Sandford?

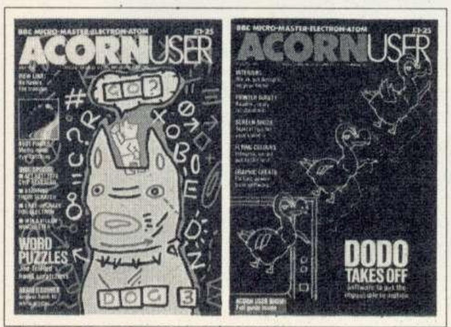
When you've finished with the Graphics, why not go on to the Best of Acorn User cassette, a comprehensive selection of 11 of our best program listings, including the Quadline and Picture Slide games, sideways RAM utilities, an all-mode graphics dump, tape to disc transfer and much more besides.

Telephone Orders 01-836 2441 9.30am to 5.00 pm. Ask for Seran. Order form on page 111

MAGAZINES & BINDERS

ACORN USER OFFERS

Three issues free–when you subscribe to Acorn User magazine



15 magazines for the price of 12

If you've enjoyed reading this issue of *Acorn User*, the biggest and best-selling BBC/Acorn magazine, why not ensure you receive your monthly copy regularly by subscription?

At the same time you'll be able to take advantage of our super special offer, and receive 15 issues of *Acorn User* magazine for the price of 12.

How else can you make sure you are up-to-date with the latest innovations, news, reviews and features. Stay in touch each month with *Acorn User* magazine, the biggest and the best!

You'll find articles covering education, business and home use, and there's a special section for new users. There are articles, hints and listings for all Acorn machines – BBC B, B+, Master, Electron and Atom. In fact, something for everyone.

This offer is only open to readers in the UK and the Republic of Ireland.

If you are an overseas subscriber turn to page 111, so that you can take advantage of our two-year rate offer. We will send you 27 issues for the price of 24, when you pay the two-year price.

Acorn User Magazine Back Issues–£1.75



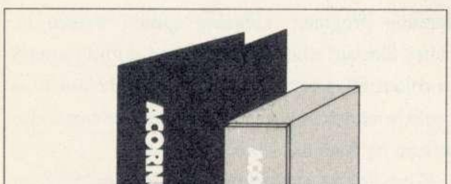
Classic issues from yesteryear

The following back issues are available by using the order form on page 111:

1984:	May	August	November
	June	September	December
	July	October	
1985:	January	June	October
	March	July	November
	April	August	
	May	September	
1986:	January	April	July
	February	May	August
	March	June	September

Send an A4 stamped addressed envelope for further details of back issue contents of *Acorn User* to Seran Anderson Haddick, Acorn User Merchandise Department, 141-143 Drury Lane, London WC2B 5TF.

Disc Binder and Slip Case £9.95 and Magazine Binder £4.95



Magazine binder and disc binder

What better way to protect your *Acorn User* monthly disc listings, or your own programs, than in the safety of this fine grey cloth disc binder?

The binder is lined in grey, and has a 30mm capacity, big enough to hold 12 monthly discs comfortably. The spine of the binder features a discreet silver *Acorn User* logo.

Included with the disc binder are six transparent inserts, each capable of holding two 5¼" discs. Last, but most importantly, there is a sturdy slip case, which will protect the binder and the discs within.

Never lose another issue and keep your *Acorn User* magazine collection in style, with this fine red *Acorn User* magazine binder.

The magazine binder features a wide spine with the capacity to hold 12 issues of more than 200 pages. The magazines are held in place with metal strips, which will allow you to fit your monthly magazine with ease.

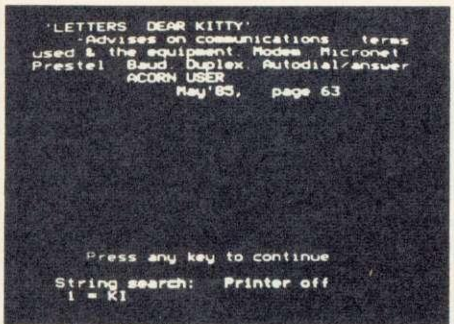
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Telephone Orders 01-836 2441 9.30am to 5.00 pm. Ask for Seran. Order form on page 111

SPECIAL PROGRAMS

ACORN USER OFFERS

Acorn User bibliography on disc – from £7.95



A page from the bibliography

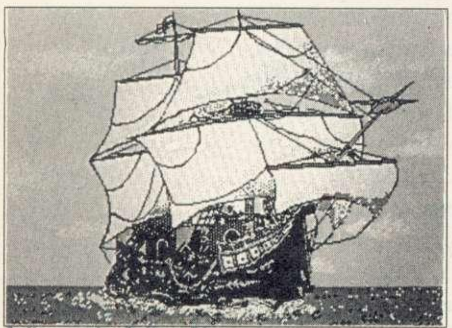
If you've ever spent hours looking through your copies of *Acorn User* for an elusive article, which you know you've seen but can't remember when or where, then what you need is the *Acorn User* bibliography!

Our bibliography contains information on where to find games, listings, educational and utility programs; reviews of hardware, firmware, peripherals, software and books; and feature articles of specific and general interest. You'll even find reference to readers' letters!

The *Acorn User* bibliography is sold in parts, in a specially enhanced format, which will make your searches even faster, taking about 15 seconds on the 40-track and 40 seconds on the 80-track disc. Location of a reference is by one- or two-string searching and the user may specify the starting month and year. Output may be to screen or printed.

There are three parts currently available; a further instalment, part 4, will become available later in the year.

Acorn User Gallery Disc – super graphics for only £6.95


Galley on the Gallery Disc

The *Acorn User* Gallery disc has proved to be immensely popular since its introduction in the August issue. It features an automatic scrolling display of over 20 stunning graphic screens.

What's more, the disc gives you the chance to dabble with a little creativity, by using the Super Painter and Pixel Editor.

These clever graphics creating programs, included on the disc, allow you to alter and edit these pictures as you like, and also give you the chance to concoct your own designs.

You can marvel at Spiderman, see the Coke can come alive, plus Robotic Brilliance, Astronaut, Elite, Wimp Fashion, Max Headroom, Sunrise, Thomas the Tank Engine, and many more screens.

And don't forget you can use our *UserDump* ROM to print all these fabulous screens too!

The Gallery disc is available as a single 80-track disc or two 40-track discs containing over 400k of graphics in under half the disc space, and costing just £6.95.

Graphics Cassette and the Best of Acorn User Cassette – £3.95



One of the Best of AU

Enormously popular and immensely useful, the Graphics cassette at a bargain price of £3.95 includes the following programs for your delight: Rob Fenton's painting program (Feb 1985), Peter Sandford's Colfill and Dotfill (Jan and Feb 1985) and Harry Sinclair's Sprite designer (Sep, Oct and Nov 1984). And all available on one cassette, suitable for use on the BBC and the Electron.

What could be more useful than the Best of *Acorn User* cassette? A comprehensive selection of 11 program listings, which includes Malcolm Banthorpe's Turtle Graphics, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine; a selection of sideways RAM routines, two games, plus much much more! Suitable for use on the BBC and the Electron.

Graphics and Best of *Acorn User* are the first two cassettes in our special cassette range. you'll be seeing further offers later in the year.

HA21

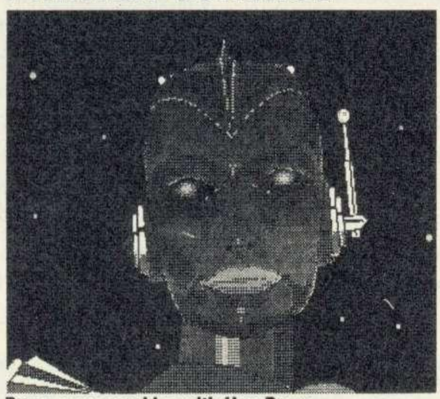
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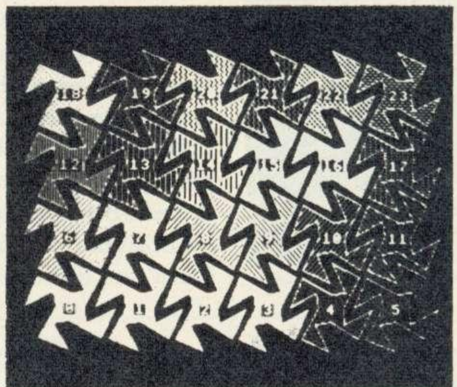
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YELLOW PAGES

INDEX/COMPATIBILITY

Entering listings

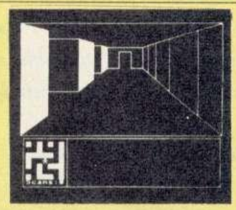
To make the task of entering listings easier, *Acorn User* has adopted several standards in the Yellow Pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the Yellow Pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the Yellow Pages will help you spot extra or missing characters.

To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering a listing, we provide a 'How to Enter' box.

Once you've typed in your program, save it to tape or disc then test it by running it. If you've made a mistake, an error message will probably appear, telling you which line contains the error. List the line and check it carefully against the published version.

If the line is the start of a procedure definition – eg, 1000 DEF PROCfred – the error may be at another line which calls the procedure. For further help with debugging, refer to First Byte in the April 1986 issue.

A-MAZE-ING



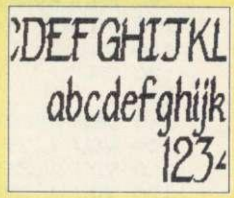
118
An imaginative and addictive 3D maze game by David Lawrence. Read how to play the game on page 88.

ON THE MENU



115
From a simple ten-liner to a sophisticated program, Joe Telford shows how to create versatile menus on page 81.

CLEVER CALLIGRAPHY



121
Print large-size ornamental lettering on your dot-matrix printer with graphics software by Mike Turner. Article: page 93.

DISCS AND TAPES



All the listings on these pages can be found on this month's listings disc or cassette. See page 107 for details.

BACK ISSUES





April 86: Programmer's aid utility; June 85: Typing in listings; Aug 84 and Sept 83: Debugging listings.

Program		Page	BBC B	BBC B+/ 128k	BBC with ADFS	Shadow RAM	Electron	Electron with Plus 1	Electron with Plus 1 and Plus 3	Master 128	Master 128 with ADFS	6502SP	Econet	Monthly cassette & disc
Hints & Tips	Listing 1	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 2	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 3	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 4	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 5	115	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(a)
	Listing 6	116	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(a)
Romfile	Listing 1	117	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	Y(b)
Joe's Jottings	Listings 1-4	120	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listings 5-6	121	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 8	122	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 9	122	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 10	123	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Maze	Listing 1	123	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Callgraphy	Listing 1	126	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 2	128	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

(a) Run with Page set to &B00 if using TUBE.

(b) Needs sideways RAM. Enter and Run with Page set to &1200.

YELLOW PAGES
HINTS & TIPS

How to enter Hints & Tips

The six listings from this month's Hints & Tips are designed for use on any BBC Micro, Electron or Master machine with an Epson-compatible printer. As with all the programs in the yellow pages, we advise that you read carefully the article they accompany. Listings 5 and 6 contain sizeable sections of machine code and so checksum routines have been included to help you spot any typing errors.

See Hints & Tips, page 50

Listing 1. Demonstrates the bit-image graphics on a printer

```
 10 REM Hints & Tips - listing 1
 20 REM Epson bit image mode
 30 REM by Martin Phillips
 40 REM for BBC B/B+/M/E with Plus 1
 50 REM (c) Acorn User September 1986
 60 :
 70 VDU 2
 80 PRINT"Function key ";
 90 PROCsymbol
100 PRINT" is shown here"
110 VDU 3
120 END
130 :
140 DEF PROCsymbol
150 VDU 1,27,1,75,1,11,1,0
160 VDU 1,255,1,247,1,193,1,183
170 VDU 1,223,1,255,1,255,1,221
180 VDU 1,129,1,253,1,255
190 ENDPROC
```

Listing 2. Demonstrates dual density bit-image graphics on an Epson

```
 10 REM Hints & Tips - listing 2
 20 REM Epson d/d bit image mode
 30 REM by Martin Phillips
 40 REM for BBC B/B+/M/E with Plus 1
 50 REM (c) Acorn User September 1986
 60 :
 70 VDU 2
 80 PRINT"Function key ";
 90 PROCsymbol
100 PRINT" is shown here"
110 VDU 3
120 END
130 :
140 DEF PROCsymbol
150 VDU 1,27,1,76,1,22,1,0
160 VDU 1,255,1,255,1,247,1,247
170 VDU 1,193,1,193,1,183,1,183
180 VDU 1,223,1,223,1,255,1,255
190 VDU 1,255,1,255,1,221,1,221
200 VDU 1,129,1,129,1,253,1,253
210 VDU 1,255,1,255
220 ENDPROC
```

Listing 3. A Basic screen dump for modes 1, 2, 4 and 5

```
 10 REM Hints & Tips - listing 3
 20 REM Modes 1,2,4 & 5 screen dump
 30 REM by Martin Phillips
 40 REM for BBC B/B+/M/E with Plus 1
```

Continued ▶

◀ Listing 3 continued

```
 50 REM (c) Acorn User September 1986
 60 :
 70 MODE 1
 80 PROCcircles
 90 PROCdump
100 END
110 :
120 DEF PROCcircles
130 VDU 19,0,4,0,0,0
140 VDU 23;8202;0;0;0;
150 VDU 29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU 29,0;0;
230 ENDPROC
240 :
250 DEF PROCdump
260 VDU 2,1,27,1,64
270 VDU 1,27,1,65,1,8
280 FOR Y%=1023 TO 0 STEP -32
290 VDU 1,27,1,75,1,64,1,1
300 FOR X%=0 TO 1279 STEP 4
310 D%=0
320 FOR y%=0 TO 7
330 D%=D%*2
340 IF POINT(X%,Y%-y%*4)>0 D%=D%+1
350 NEXT y%:VDU 1,D%
360 NEXT X%
370 VDU 1,10:NEXT Y%
380 VDU 1,27,1,64,3
390 ENDPROC
```

Listing 4. A mode 0 Basic screen dump

```
 10 REM Hints & Tips - listing 4
 20 REM Mode 0 screen dump
 30 REM by Martin Phillips
 40 REM for BBC B/B+/M/E with Plus 1
 50 REM (c) Acorn User September 1986
 60 :
 70 MODE 0
 80 PROCcircles
 90 PROCdump
100 END
110 :
120 DEF PROCcircles
130 VDU 19,0,4,0,0,0
140 VDU 23;8202;0;0;0;
150 VDU 29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU 29,0;0;
230 ENDPROC
240 :
250 DEF PROCdump
260 VDU 2,1,27,1,64
270 VDU 1,27,1,65,1,8
280 FOR Y%=1023 TO 0 STEP -32
290 VDU 1,27,1,76,1,128,1,2
300 FOR X%=0 TO 1279 STEP 2
```

Continued ▶

◀ Listing 4 continued

```
310 D%=0
320 FOR y%=0 TO 7
330 D%=D%*2
340 IF POINT(X%,Y%-y%*4)>0 D%=D%+1
350 NEXT y%:VDU 1,D%
360 NEXT X%
370 VDU 1,10
380 NEXT Y%
390 VDU 1,27,1,64,3
400 ENDPROC
```

Listing 5. A machine code screen dump for modes 1, 2, 4 and 5

```
10 REM Hints & Tips - listing 5
20 REM Modes 1/2/4/5 MC screen dump
30 REM by Martin Phillips
40 REM for BBC B/B+/M/E (with plus1)
50 REM (c) Acorn User September 1986
60 :
70 PROCassemble
80 MODE 1
90 PROCcircles
100 CALL &900
110 END
120 :
130 DEF PROCcircles
140 VDU 19,0,4,0,0,0
150 VDU 23;8202;0;0;0;
160 VDU 29,640;512;
170 FOR N%=100 TO 500 STEP 80
180 FOR T%=-1 TO 1 STEP 2
190 MOVE -N%,0
200 FOR X%=-N% TO N% STEP 8
210 DRAW X%,T%*(SQR(N%*N%-X%*X%))
220 NEXT X%,T%,N%
230 VDU 29,0;0;
240 ENDPROC
250 :
260 DEF PROCassemble
270 xlo=&70:xhi=&71:ylo=&72:yhi=&73
280 pixel=&74:byte=&75:bitcount=&76
290 oswrch=&FFEE:osword=&FFF1
300 FOR pass=0 TO 2 STEP 2
310 P%=&900
320 [OPT pass
330 LDA #2
340 JSR oswrch
350 LDA #255
360 STA ylo
370 LDA #3
380 STA yhi
390 LDA #27
400 JSR printer
410 LDA #65
420 JSR printer
430 LDA #8
440 JSR printer
450 .newline
460 LDA #0
470 STA xlo
480 STA xhi
490 LDA #27
500 JSR printer
510 LDA #75
520 JSR printer
530 LDA #64
540 JSR printer
```

Continued ▶

◀ Continued

```
550 LDA #1
560 JSR printer
570 .newcolumn
580 LDA #8
590 STA bitcount
600 .readpixel
610 LDX #xlo
620 LDY #0
630 LDA #9
640 JSR osword
650 CLC
660 LDA pixel
670 BEQ setbyte
680 SEC
690 .setbyte
700 ROL byte
710 LDA ylo
720 SEC
730 SBC #4
740 STA ylo
750 BCS columnend
760 DEC yhi
770 .columnend
780 DEC bitcount
790 LDA bitcount
800 BNE readpixel
810 LDA byte
820 JSR printer
830 CLC
840 LDA #4
850 ADC xlo
860 STA xlo
870 BCC lineend
880 INC xhi
890 .lineend
900 LDA xhi
910 CMP #5
920 BEQ endline
930 LDA #32
940 CLC
950 ADC ylo
960 STA ylo
970 BCC newcolumn
980 INC yhi
990 BCS newcolumn
1000 .endline
1010 LDA #10
1020 JSR printer
1030 .checkend
1040 LDA yhi
1050 BMI end
1060 JMP newline
1070 .end
1080 LDA #27
1090 JSR printer
1100 LDA #64
1110 JSR printer
1120 LDA #3
1130 JSR oswrch
1140 RTS
1150 .printer
1160 PHA
1170 LDA #1
1180 JSR oswrch
1190 PLA
1200 JSR oswrch
1210 RTS
1220 ]:NEXT pass
1230 :
```

Continued ▶

◀ **Hints & Tips listing 5 continued**

```
1240 REM Checksum
1250 total%=0
1260 FOR byte%=&900 TO P%-1
1270 total%=total%+?byte%
1280 NEXT byte%
1290 IF total%<>17939 PRINT"Checksum er
ror - please check listing":END
1300 ENDPROC
```

Listing 6. A machine code screen dump for mode 0 (NB. WIDTH = 24)

```
  10 REM Hints & Tips -
 listing 6
  20 REM Mode 0 MC scre
en dump
  30 REM by Martin Phil
lips
  40 REM for BBC B/B+/M
/E (with plus1)
  50 REM (c) Acorn User
 September 1986
  60 :
  70 PROCassemble
  80 MODE 0
  90 PROCcircles
 100 CALL &900
 110 END
 120 :
 130 DEF PROCcircles
 140 VDU 19,0,4,0,0,0
 150 VDU 23;8202;0;0;0;
 160 VDU 29,640;512;
 170 FOR N%=100 TO 500
STEP 80
 180 FOR T%=-1 TO 1 STE
P 2
 190 MOVE -N%,0
 200 FOR X%=-N% TO N% S
TEP 8
 210 DRAW X%,T%*(SQR(N%
*N%-X%*X%))
 220 NEXT X%,T%,N%
 230 VDU 29,0;0;
 240 ENDPROC
 250 :
 260 DEF PROCassemble
 270 xlo=&70:xhi=&71:yl
o=&72:yhi=&73
 280 pixel=&74:byte=&75
:bitcount=&76
 290 oswrch=&FFEE:oswor
d=&FFF1
 300 FOR pass=0 TO 2 ST
EP 2
 310 P%=&900
 320 [OPT pass
 330 LDA #2
 340 JSR oswrch
 350 LDA #255
 360 STA ylo
 370 LDA #3
 380 STA yhi
 390 LDA #27
 400 JSR printer
 410 LDA #65
 420 JSR printer
 430 LDA #8
 440 JSR printer
 450 .newline
 460 LDA #0
 470 STA xlo
 480 STA xhi
 490 LDA #27
 500 JSR printer
 510 LDA #76
 520 JSR printer
 530 LDA #128
 540 JSR printer
 550 LDA #2
 560 JSR printer
 570 .newcolumn
 580 LDA #8
 590 STA bitcount
 600 .readpixel
 610 LDX #xlo
 620 LDY #0
 630 LDA #9
 640 JSR osword
 650 CLC
 660 LDA pixel
 670 BEQ setbyte
 680 SEC
 690 .setbyte
 700 ROL byte
 710 LDA ylo
 720 SEC
 730 SBC #4
 740 STA ylo
 750 BCS columnend
 760 DEC yhi
 770 .columnend
 780 DEC bitcount
 790 LDA bitcount
 800 BNE readpixel
 810 LDA byte
 820 JSR printer
 830 CLC
 840 LDA #2
 850 ADC xlo
 860 STA xlo
 870 BCC lineend
 880 INC xhi
 890 .lineend
 900 LDA xhi
 910 CMP #5
 920 BEQ endline
 930 LDA #32
 940 CLC
 950 ADC ylo
 960 STA ylo
 970 BCC newcolumn
 980 INC yhi
 990 BCS newcolumn
1000 .endline
1010 LDA #10
1020 JSR printer
1030 .checkend
1040 LDA yhi
1050 BMI end
1060 JMP newline
1070 .end
1080 LDA #27
1090 JSR printer
1100 LDA #64
1110 JSR printer
1120 LDA #3
1130 JSR oswrch
1140 RTS
1150 .printer
1160 PHA
1170 LDA #1
1180 JSR oswrch
1190 PLA
1200 JSR oswrch
1210 RTS
1220 ]:NEXT pass
1230 :
1240 REM Checksum
1250 total%=0
1260 FOR byte%=&900 TO
P%-1
1270 total%=total%+?byt
e%
1280 NEXT byte%
1290 IF total%<>18003 P
RINT"Checksum error - pl
ease check listing":END
1300 ENDPROC
```

How to enter Romfile

Type in the main program as shown. The listing includes a fair chunk of assembly code and the program contains its own checking routines. If a typing error has been entered you will be notified when the program is run. A message displaying the section of program at fault is also given. All users (except tape users – see below) should type in the program with PAGE set to &1200. This is done by typing:
PAGE = &1200 <RETURN>
NEW <RETURN>
and then copying out the listing.

Tape Users

If you plan to use the Romfile system on a tape-based machine, several adjustments need to be made to the program. Notes on doing this, with a list of the lines that need to be amended, are given in the article on page 104.

Electron users with Sideways RAM

The program as it stands will not operate correctly on an Electron, however, a version specifically for this machine has been supplied on the monthly cassette on side 2.

YELLOW PAGES
UTILITIES

See File it Sideways, page 102

Listing 1. Scrambles a set of files into ROM Filing System format

```
   10 REM Romfile
   20 REM Mike Rawlings
   30 REM for BBC B/B+/M
 with s/w Ram
   40 REM (c) Acorn User
 September 1986
   50 :
   60 MODE 7
   70 IF PAGE>&1200 THEN
 PROCreloc
   80 LOMEM=&7400
   90 DIM control% 17, n
ame% 80
  100 osfile=&FFDD
  110 p%=&8000-&3400
  120 PRINT
  130 FOR x=0 TO 1
  140 PRINTCHR$(141)SPC(
10);
  150 PRINT"Acorn User R
omfile"
  160 NEXT
  170 VDU 28,0,23,39,4
  180 REPEAT:INPUT"Ram s
ocket:"bk:UNTILbk>=0 AND
 bk<16
  190 PROCass:C%=0
  200 FOR x=crc TO(read-
1):C%=C%+?x
  210 NEXT:IF C%<>5782 P
ROCerr("CRC")
  220 !&8B=&70:?&8F=chec
k-&70:CALL crc
  230 x=!&8D AND &FFFF
  240 IF x<>26070 PROCer
r("INPUT")
  250 !&8B=read:?&8F=P%-
read:CALL crc
  260 x=!&8D AND &FFFF
  270 REPEATREADs,v:UNTI
Ls=bk
  280 IFv<>x THEN PROCer
r("READ/WRITE")
  290 PRINTTAB(0,8)CHR$(
134);
  300 PRINT"Romfile Titl
e ?"CHR$(133);
  310 title$=FNinput(7)
  320 PRINTTAB(0,10)CHR$
(134);
  330 PRINT"8k or 16k Ra
m?"CHR$(133);
  340 REPEAT x=GET
  350 UNTIL x=56 OR x=49
  360 VDU x
  370 IF x=56 rom=&2000:
GOTO 420
  380 REPEAT x=GET
  390 UNTIL x=54
  400 VDU x
  410 rom=0
  420 REPEAT x=GET
  430 UNTIL x=13
  440 PROCromsetup
  450 IF title$="TEST123
" PROCcheck
  460 PROCmemleft
  470 IF memleft<1 PRINT
"No memory left!":GOTO 6
10
  480 *FX 15
  490 PRINTTAB(0,8)CHR$(
134);
  500 PRINT"Filename ?"C
HR$(133);
  510 file$=FNinput(7)
  520 PROCoscli("LOAD "+
file$+" 3400")
  530 PROCrdaddr
  540 x=length DIV 256
  550 x=x-((length MOD 2
56)<>0)
  560 search=P%+length+(
23+LEN(file$))*(1-(x>1))
-(x-2)*3*(x>1)
  570 IF length>memleft
GOTO 730
  580 PROCencode
  590 PROCmore
  600 IF x=89 VDU 28,0,2
3,39,4:GOTO 460
  610 PRINT'CHR$(130);
  620 PRINT"Press SPACE
to save"
  630 REPEAT:UNTIL GET=3
2
  640 PROCequb(43)
  650 PROCsave
  660 VDU 7
  670 PROCmore
  680 IF x=89 CLS:GOTO 2
90
  690 *FX 18
  700 PRINT'"Press Break
."
  710 END
  720 :
  730 IF length>&3400 GO
TO 780
  740 PRINTTAB(0,8)CHR$(
129);
  750 PRINT"This file is
 too long!"
  760 GOTO 590
  770 :
  780 CLS
  790 PRINTTAB(0,9)CHR$(
129);
  800 PRINT"This file is
 far too long!"
  810 PRINTCHR$(129)"You
 will have to ";
  820 PRINT"start again"
  830 x=GET
  840 RUN
  850 :
  860 DEF PROCromsetup
  870 FOR pass=0 TO 2 ST
EP 2
  880 P%=&3400
  890 PROCequw(0)
  900 PROCequb(0)
  910 [OPT pass
  920 JMP entry+p%
  930 ]
  940 PROCequb(&83)
  950 PROCequb(LEN(title
$)+9)
  960 PROCequb(1)
  970 PROCequs(title$)
  980 PROCequb(0)
  990 PROCequs("(C) Acor
n User / ")
 1000 PROCequb(0)
 1010 [OPT pass
 1020 .entry
 1030 CMP #3
 1040 BEQ v4
 1050 CMP #9
 1060 BEQ v1
 1070 CMP #13
 1080 BEQ v2
 1090 CMP #14
 1100 BEQ v3
 1110 RTS
 1120 .v1
 1130 JMP help1+p%
 1140 .v2
 1150 JMP file+p%
 1160 .v3
 1170 JMP byte+p%
 1180 .v4
 1190 JMP boot+p%
 1200 .help1
 1210 PHA
 1220 LDA (&F2),Y
 1230 CMP #13
 1240 BNE help2
 1250 LDX #0
 1260 .loop1
 1270 LDA message1+p%,X
 1280 INX
 1290 CMP #0
 1300 BEQ exit1
 1310 JSR &FFE3
 1320 JMP loop1+p%
 1330 .exit1
 1340 PLA
 1350 RTS
 1360 .message1
 1370 ]
 1380 PROCequb(13)
 1390 PROCequs("Acorn Us
er Romfile")
 1400 PROCequb(13)
 1410 PROCequs("Type *HE
LP ROMFILE")
 1420 PROCequb(13)
 1430 PROCequb(13)
 1440 PROCequb(0)
 1450 [OPT pass
 1460 .help2
 1470 TYA
 1480 PHA
 1490 LDX #0
 1500 .loop2
 1510 LDA (&F2),Y
 1520 AND #&DF
 1530 CMP #&21
 1540 BCC skip1
 1550 CMP romfile+p%,X
 1560 BNE exit2
 1570 INX
 1580 INY
 1590 JMP loop2+p%
 1600 .skip1
 1610 LDA romfile+p%,X
```

Continued ▶

◀ Rawlings' listing 1 continued

```
 1620 BNE exit2
 1630 JMP help3+p%
 1640 .exit2
 1650 PLA
 1660 TAY
 1670 PLA
 1680 RTS
 1690 .romfile
 1700 ]
 1710 PROCequs("ROMFILE"
)
 1720 PROCequb(0)
 1730 [OPT pass
 1740 .help3
 1750 LDX #0
 1760 .loop3
 1770 LDA message2+p%,X
 1780 INX
 1790 CMP #0
 1800 BEQ exit2
 1810 JSR &FFE3
 1820 JMP loop3+p%
 1830 .message2
 1840 ]
 1850 PROCequb(13)
 1860 PROCequs("  To loa
d any program ")
 1870 PROCequs("from Aco
rn User's")
 1880 PROCequb(13)
 1890 PROCequs("ROMFILE
type *ROM ")
 1900 PROCequs("followed
 by <return>")
 1910 PROCequb(13)
 1920 PROCequs("then LOA
D, CHAIN, ")
 1930 PROCequs("*LOAD, *
RUN, *CAT")
 1940 PROCequb(13)
 1950 PROCequs("etc. in
the normal way")
 1960 PROCequb(13)
 1970 PROCequb(0)
 1980 [OPT pass
 1990 .file
 2000 PHA
 2010 TYA
 2020 EOR #&F
 2030 CMP &F4
 2040 BCC exit3
 2050 LDA #((data+p%) MO
D 256)
 2060 STA &F6
 2070 LDA #((data+p%) DI
V 256)
 2080 STA &F7
 2090 LDA &F4
 2100 EOR #&F
 2110 STA &F5
 2120 PLA
 2130 LDA #0
 2140 RTS
 2150 .exit3
 2160 PLA
 2170 RTS
 2180 .byte
 2190 PHA
 2200 LDA &F5
 2210 EOR #&F
 2220 CMP &F4
 2230 BNE exit3
 2240 LDY #0
 2250 LDA (&F6),Y
 2260 TAY
 2270 INC &F6
 2280 BNE skip2
 2290 INC &F7
 2300 .skip2
 2310 PLA
 2320 LDA #0
 2330 RTS
 2340 .boot
 2350 PHA
 2360 TYA
 2370 PHA
 2380 LDY #0
 2390 .loop4
 2400 LDA message3+p%,Y
 2410 BEQ exit4
 2420 JSR &FFE3
 2430 INY
 2440 JMP loop4+p%
 2450 .message3
 2460 ]
 2470 PROCequs("Romfile:
 2480 PROCequb(134)
 2490 PROCequs(title$)
 2500 PROCequb(13)
 2510 PROCequb(13)
 2520 PROCequb(0)
 2530 [OPT pass
 2540 .exit4
 2550 PLA
 2560 TAY
 2570 PLA
 2580 RTS
 2590 .data
 2600 ]NEXT
 2610 ?&8F=((data-&3400)
/256)+1
 2620 !&8B=&34008000
 2630 ?&89=0
 2640 CALL write
 2650 P%=P%+p%
 2660 ENDPROC
 2670 :
 2680 DEF PROCass
 2690 P%=&70
 2700 [OPT 0
 2710 .input
 2720 CLC
 2730 LDA #0
 2740 TAX
 2750 STX &8B
 2760 LDX #&C
 2770 STX &8C
 2780 LDX #32
 2790 STX &8E
 2800 LDX #127
 2810 STX &8F
 2820 TAY
 2830 LDX #&8B
 2840 JSR &FFF1
 2850 RTS
 2860 .check
 2870 ]
 2880 :
 2890 FOR pass=0 TO 2 ST
EP 2
 2900 P%=&900
 2910 [OPT pass
 2920 .crc
 2930 CLC
 2940 LDA #0
 2950 STA &8E
 2960 STA &8D
 2970 TAY
 2980 .loop1
 2990 LDA &8E
 3000 EOR (&8B),Y
 3010 STA &8E
 3020 LDX #8
 3030 .loop2
 3040 LDA &8E
 3050 ROL A
 3060 BCC skip
 3070 LDA &8E
 3080 EOR #8
 3090 STA &8E
 3100 LDA &8D
 3110 EOR #16
 3120 STA &8D
 3130 .skip
 3140 ROL &8D
 3150 ROL &8E
 3160 DEX
 3170 BNE loop2
 3180 INY
 3190 CPY &8F
 3200 BNE loop1
 3210 RTS
 3220 .read
 3230 LDA #&80
 3240 STA &8E
 3250 LDA #&34
 3260 STA &8C
 3270 LDY #0
 3280 STY &8D
 3290 STY &8B
 3300 STY &89
 3310 .write
 3320 LDY #0
 3330 LDA &F4
 3340 PHA
 3350 LDA #bk
 3360 STA &FE30
 3370 LDX &8F
 3380 .loop3
 3390 LDA (&8D),Y
 3400 STA (&8B),Y
 3410 INY
 3420 CPY &89
 3430 BNE loop3
 3440 INC &8C
 3450 INC &8E
 3460 DEX
 3470 BNE loop3
 3480 PLA
 3490 STA &FE30
 3500 RTS
 3510 ]NEXT
 3520 ENDPROC
 3530 :
 3540 DEF FNinput(x)
 3550 PRINTSTRING$(x,CHR
$(9))CHR$(124);
 3560 PRINTSTRING$(x+1,C
HR$(8));
 3570 ?&8D=x
 3580 CALL &70
```

Continued ▶

◀ **Rawlings' listing 1 continued**

```
 3590 =$&C00
 3600 :
 3610 DEF PROCmemleft
 3620 x=&C000-P%-rom-30
 3630 IF x<257 memleft=x
ELSE x=x-30:IF x<513 me
mleft=x ELSE memleft=x-(
(x-512) DIV 259)*3+(((x-
512) MOD 259)<>0)*3
 3640 CLS
 3650 PRINT'SPC(6)CHR$(1
31);
 3660 PRINT"MAXIMUM FILE
LENGTH = &";
 3670 PRINT;~memleft
 3680 VDU 28,0,23,39,8
 3690 ENDPROC
 3700 :
 3710 DEF PROCencode
 3720 @%=6
 3730 block=0:address=&3
400
 3740 flag=0:blen=256
 3750 IF length<257 blen
=length:flag=&80
 3760 PROCheader
 3770 PRINTTAB(0,10)CHR$
(131);
 3780 PRINTfile$ ~block
 3790 ?&89=blen:?&8F=1:!
&8B=P%
 3800 ?&8D=address MOD 2
56
 3810 ?&8E=address DIV 2
56
 3820 CALL write
 3830 !&8B=address:?&8F=
blen
 3840 CALL crc
 3850 hcrc=?&8E:lcrc=?&8
D
 3860 P%=P%+blen
 3870 address=address+bl
en
 3880 length=length-blen
 3890 block=block+1
 3900 PROCequb(hcrc)
 3910 PROCequb(lcrc)
 3920 IF flag=&80 @%=5:P
RINTTAB(14,10)~!&2F8:VDU
7:ENDPROC
 3930 IF length<257 GOTO
3750
 3940 PROCequb(35)
 3950 GOTO 3770
 3960 :
 3970 DEF PROChblock
 3980 PROCequb(42)
 3990 PROCequs(file$)
 4000 PROCequb(0)
 4010 PROCequd(load)
 4020 PROCequd(exec)
 4030 PROCequw(block)
 4040 PROCequw(blen)
 4050 PROCequb(flag)
 4060 PROCequd(search)
 4070 ENDPROC
 4080 :
 4090 DEF PROCheader
 4100 x=P%:P%=&980
 4110 PROChblock
 4120 !&8B=&981:?&8F=P%-
&981
 4130 CALL crc
 4140 hcrc=?&8E:lcrc=?&8
D:P%=x
 4150 PROChblock
 4160 PROCequb(hcrc)
 4170 PROCequb(lcrc)
 4180 ENDPROC
 4190 :
 4200 DEF PROCsave
 4210 ?&8F=((P%-&8000)/2
56)+1
 4220 CALL read
 4230 VDU 28,0,23,39,4
 4240 CLS
 4250 PRINTTAB(0,8)CHR$(
134);
 4260 PRINT"Saving ";tit
le$
 4270 PROCoscli("SAVE "+
title$+" 3400 +"+STR$~(P
%-&8000)+" FFFFD9CD FFFF
8000")
 4280 x=TIME+300:REPEAT:
UNTIL x<TIME
 4290 ENDPROC
 4300 :
 4310 DEF PROCequb(n)
 4320 PROCsetequ
 4330 ?&89=1:?&9F0=n
 4340 CALL write
 4350 P%=P%+1
 4360 ENDPROC
 4370 :
 4380 DEF PROCequw(n)
 4390 PROCsetequ
 4400 ?&89=2:!&9F0=n
 4410 CALL write
 4420 P%=P%+2
 4430 ENDPROC
 4440 :
 4450 DEF PROCequd(n)
 4460 PROCsetequ
 4470 ?&89=4:!&9F0=n
 4480 CALL write
 4490 P%=P%+4
 4500 ENDPROC
 4510 :
 4520 DEF PROCequs(n$)
 4530 PROCsetequ
 4540 ?&89=LEN(n$):$&9F0
=n$
 4550 CALL write
 4560 P%=P%+LEN(n$)
 4570 ENDPROC
 4580 :
 4590 DEF PROCoscli(n$)
 4600 $&980=n$:Y%=&9:X%=
&80
 4610 CALL &FFF7
 4620 ENDPROC
 4630 :
 4640 DEF PROCmore
 4650 PRINTTAB(0,12)CHR$
(134);
 4660 PRINT"Any More ?"C
HR$(133);
 4670 REPEAT x=GET
 4680 x=(x OR &20)-32
 4690 UNTIL x=89 OR x=78
 4700 VDU x
 4710 ENDPROC
 4720 :
 4730 DEF PROCsetequ
 4740 ?&8F=1:!&8B=P%:?&8
D=&F0:?&8E=&9
 4750 ENDPROC
 4760 :
 4770 DEF PROCerr(n$)
 4780 CLS
 4790 PRINT'"There is an
error in the ";
 4800 PRINTn$'"routine,
";
 4810 PRINT"please check
again!"
 4820 END
 4830 :
 4840 DEF PROCcheck
 4850 !&8B=&3400:?&8F=me
ssage2-&3400
 4860 CALL crc
 4870 x=!&8D AND &FFFF
 4880 IF x<>42307 PROCer
r("SETUP")
 4890 !&8B=message2:?&8F
=P%-message2
 4900 CALL crc
 4910 x=!&8D AND &FFFF
 4920 IF x<>1569 PROCerr
("SETUP")
 4930 CLS:PRINT'"Code is
correct"
 4940 END
 4950 :
 4960 DEF PROCrdaddr
 4970 !control%=name%
 4980 $name%=file$
 4990 X%=control%
 5000 Y%=control% DIV 25
6
 5010 A%=5:CALL osfile
 5020 length=control%!10
 5030 load=control%!2
 5040 exec=control%!6
 5050 ENDPROC
 5060 :
 5070 DEF PROCreloc
 5080 PRINT"Relocating .
.. Please wait"
 5090 FOR X%=0 TO TOP-PA
GE STEP 4
 5100 X%!&1200=X%!PAGE
 5110 NEXT
 5120 PAGE=&1200
 5130 *KEY 0 OLD|MRUN|M
 5140 *FX 138,0,128
 5150 END
 5160 :
 5170 DATA 0,2644,1,7986
,2,8344,3,13822
 5180 DATA 4,24524,5,191
14,6,29952,7,24678
 5190 DATA 8,41316,9,460
82,10,35752,11,40654
 5200 DATA 12,62716,13,5
7754,14,56880,15,52054
```

JOE'S JOTTINGS

See On the Menu, page 81

How to enter Joe's Jottings

PROCdouble in listing 5 (starting at line 330) should be added to listings 6-8 as well. Type in PROCdouble separately starting at line 2000, and then spool it to a file on disc or tape, by typing in:
**SPOOL double <RETURN>*
LIST 2000, <RETURN>
**SPOOL <RETURN>*
Then to add PROCdouble to listing 6, load this in and type:
**EXEC double <RETURN>*
Now save the complete program. Repeat for listings 7 and 8.
The four sound procedures given in listing 10 should be added to each of listings 1 to 9 using the technique outlined above.

Listing 1. A simple menu

```
   10 REM Joe's Jottings
 - listing 1
   20 REM Simple menu, 1
   30 REM by Joe Telford
   40  REM BBC B/B+/M/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 MODE 4
   80 REPEAT
   90 PRINT'"1.....Siren
1"
  100 PRINT'"2.....Siren
2"
  110 PRINT'"3.....Siren
3"
  120 INPUT'"Which? "cho
ice
  130 IF choice=1 PROCsi
ren1
  140 IF choice=2 PROCsi
ren2
  150 IF choice=3 PROCsi
ren3
  160 UNTIL FALSE
```

Listing 2. An upgraded version of listing 1

```
   10 REM Joe's Jottings
 - listing 2
   20 REM A simple menu
(2)
   30 REM by Joe Telford
   40 REM for BBC B/B+/M
/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 MODE 4
   80 REPEAT
   90 REPEAT
  100 PRINT'"1.....END"
  110 PRINT'"2.....RE-RU
N"
  120 PRINT'"3.....Siren
1"
  130 PRINT'"4.....Siren
2"
  140 PRINT'"5.....Siren
3"
  150 INPUT'"Which? "cho
ice
  160 UNTIL choice>0 AND
 choice<6
  170 IF choice=1 PRINT'
"Ended!":END
  180 IF choice=2 RUN
  190 IF choice=3 PROCsi
ren1
  200 IF choice=4 PROCsi
ren2
  210 IF choice=5 PROCsi
ren3
  220 UNTIL FALSE
```

Listing 3. Menu with a procedure

```
   10 REM Joe's Jottings
 - listing 3
   20 REM Proceduralised
 menu
   30 REM by Joe Telford
   40 REM for BBC B/B+/M
/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 MODE 4
   80 REPEAT
   90 PROCmenu
  100 IF choice=1 PRINT'
"Ended!":END
  110 IF choice=2 RUN
  120 IF choice=3 PROCsi
ren1
  130 IF choice=4 PROCsi
ren2
  140 IF choice=5 PROCsi
ren3
  150 UNTIL FALSE
  160 :
  170 DEF PROCmenu
  180 REPEAT
  190 PRINT'"1.....END"
  200 PRINT'"2.....RE-RU
N"
  210 PRINT'"3.....Siren
1"
  220 PRINT'"4.....Siren
2"
  230 PRINT'"5.....Siren
3"
  240 INPUT'"Which? "cho
ice
  250 UNTIL choice>0 AND
 choice<6
  260 ENDPROC
```

Listing 4. A function menu

```
   10 REM Joe's Jottings
 - listing 4
   20 REM Function menu
   30 REM by Joe Telford
   40 REM for BBC B/B+/M
/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 MODE 4
   80 REPEAT
   90 choice=FNmenu
  100 IF choice=1 PRINT'
"Ended!":END
  110 IF choice=2 RUN
  120 IF choice=3 PROCsi
ren1
  130 IF choice=4 PROCsi
ren2
  140 IF choice=5 PROCsi
ren3
  150 UNTIL FALSE
  160 :
  170 DEF FNmenu
  180 LOCAL choice
  190 PRINT'"1.....END"
  200 PRINT'"2.....RE-RU
N"
  210 PRINT'"3.....Siren
1"
  220 PRINT'"4.....Siren
2"
  230 PRINT'"5.....Siren
3"
  240 REPEAT
  250 INPUT'"Which? "cho
ice
  260 IF choice<1 OR cho
ice>5 PRINT"Range of cho
ices must be 1.2.3.4.5"
  270 UNTIL choice>0 AND
 choice<6
  280 =choice
```

JOE'S JOTTINGS

Listing 5. An improved function menu incorporating double-height text

```
10 REM Joe's Jottings - listing 5
20 REM Improved function menu
30 REM by Joe Telford
40 REM for BBC B/B+/M/E
50 REM (c) Acorn User September 1986
60 :
70 MODE 4
80 REPEAT
90 choice=FNmenu(1,5)
100 IF choice=1 PRINT'"Ended!":END
110 IF choice=2 RUN
120 IF choice=3 PROCsiren1
130 IF choice=4 PROCsiren2
140 IF choice=5 PROCsiren3
150 UNTIL FALSE
160 :
170 DEF FNmenu(min,max)
180 LOCAL ch
190 PROCdouble(128,0,"Sound Effects Menu")
200 PRINTTAB(4,3);"Please choose an option from ";min;" to ";max
210 PRINTTAB(14,5);"1.....END"
220 PRINTTAB(14,7);"2.....RE-RUN"
230 PRINTTAB(14,9);"3.....Siren1"
240 PRINTTAB(14,11);"4.....Siren2"
250 PRINTTAB(14,13);"5.....Siren3"
260 REPEAT
270 PRINTTAB(4,15)"Which?"+STRING$(20," ")
280 INPUTTAB(14,15)""ch
290 IF ch<min OR ch>max PRINTTAB(4,17);ch" is out of the range: ";min" to ";max
300 UNTILch>=min AND ch<=max
310 =ch
320 :
330 DEF PROCdouble(x,y,z$)
340 LOCAL c%
350 c%=&70
360 IF x>80 THEN PRINTTAB(20-LENz$ DIV 2,y);:ELSE PRINTTAB(x,y);
370 FOR loop%=1 TO LEN(z$)
380 ?c%=ASC(MID$(z$,loop%,1))
390 X%=c% MOD 256
400 Y%=c% DIV 256
410 A%=10
420 CALL &FFF1
430 VDU 23,128,c%?1,c%?1,c%?2,c%?2,c%?3,c%?3,c%?4,c%?4,128,10,8,23,128,c%?5,c%?5,c%?6,c%?6,c%?7,c%?7,c%?8,c%?8,128,11
440 NEXT
450 ENDPROC
```

Listing 6. A moving pointer menu (don't forget to add the double-height procedures)

```
10 REM Joe's Jottings - listing 6
20 REM Moving pointer menu
30 REM by Joe Telford
40 REM for BBC B/B+/M/E
50 REM (c) Acorn User September 1986
60 :
70 ON ERROR *FX 4,0
80 MODE 4
90 REPEAT
100 choice=FNmenu(1,5)
110 IF choice=1 PRINT'"Ended!":VDU23,1,3;0;0;0;:END
120 IF choice=2 RUN
130 IF choice=3 PROCsiren1
140 IF choice=4 PROCsiren2
150 IF choice=5 PROCsiren3
160 UNTIL FALSE
170 :
180 DEF FNmenu(min,max)
190 VDU 23,1,0;0;0;0;
200 LOCAL menuptr
210 PROCdouble(128,0,"Sound Effects Menu")
220 PRINTTAB(14,5);"1.....END"
230 PRINTTAB(14,7);"2.....RE-RUN"
240 PRINTTAB(14,9);"3.....Siren1"
250 PRINTTAB(14,11);"4.....Siren2"
260 PRINTTAB(14,13);"5.....Siren3"
270 PRINTTAB(4,15)"Use Cursor ^ and v to move arrow"
280 PRINTTAB(4,16)"  Press RETURN to select "
290 *FX 4,1
300 menuptr=1
310 REPEAT
320 PRINTTAB(11,menuptr*2+3);"->";
330 key=GET
340 PRINTTAB(11,menuptr*2+3);"  ";
350 IF key=139 menuptr=menuptr-1:IF menuptr=min-1 menuptr=max
360 IF key=138 menuptr=menuptr+1:IF menuptr=max+1 menuptr=min
370 UNTIL key=13
380 *FX 4,0
390 =menuptr
```

Listing 7. A moving bar menu (don't forget to add the double-height procedures)

```
10 REM Joe's Jottings - listing 7
20 REM Moving bar menu
30 REM by Joe Telford
40 REM for BBC B/B+/M/E
50 REM (c) Acorn User September 1986
60 :
70 DIM menu$(5)
80 ON ERROR *FX 4,0
90 MODE 4
100 REPEAT
110 choice=FNmenu(1,5)
120 IF choice=1 PRINT'"Ended!":VDU23,1,3;0;0;0;:END
130 IF choice=2 RUN
140 IF choice=3 PROCsiren1
150 IF choice=4 PROCsiren2
160 IF choice=5 PROCsiren3
170 UNTIL FALSE
180 :
190 DEF FNmenu(min,max)
200 menu$(1)=" END       "
210 menu$(2)=" RE-RUN    "
220 menu$(3)=" Siren 1   "
230 menu$(4)=" siren 2   "
240 menu$(5)=" Siren 3   "
```

Continued ►

◀ **Joe's listing 7 continued**

```
   250 VDU 23,1,0;0;0;0;
   260 LOCAL menuptr,loop
%
   270 *FX 4,1
   280 menuptr=1
   290 PROCdouble(128,0,"
Sound Effects Menu")
   300 REPEAT
   310 FOR loop%=min TO m
ax
   320 IF loop%=menuptr C
OLOUR0:COLOUR129 ELSE CO
LOUR1:COLOUR 128
   330 PRINTTAB(16,3+loop
%*2);menu$(loop%)
   340 NEXT
   350 COLOUR 1:COLOUR 12
8
   360 PRINT'TAB(5)"Use C
ursor ^ and v to move ba
r"
   370 PRINTTAB(5)"     Pr
ess RETURN to select"
   380 key=GET
   390 IF key=139 menuptr
=menuptr-1:IF menuptr=mi
n-1 menuptr=max
   400 IF key=138 menuptr
=menuptr+1:IF menuptr=ma
x+1 menuptr=min
   410 UNTIL key=13
   420 *FX 4,0
   430 =menuptr
```

Listing 8. Moving bars with explanations

```
   10 REM Joe's Jottings
 - listing 8
   20 REM Moving bars wi
th explanations
   30 REM by Joe Telford
   40 REM for BBC B/B+/M
/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 DIM menu$(5)
   80 ON ERROR *FX4,0
   90 MODE 4
  100 VDU 19,0,4,0;0;0;
  110 VDU 19,1,3,0;0;0;
  120 REPEAT
  130 choice=FNmenu(1,5)
  140 IF choice=1 PRINT'
"Ended!":VDU23,1,3;0;0;0
;:END
  150 IF choice=2 RUN
  160 IF choice=3 PROCsi
ren1
  170 IF choice=4 PROCsi
ren2
  180 IF choice=5 PROCsi
ren3
  190 UNTIL FALSE
  200 :
  210 DEF FNmenu(min,max
)
  220 menu$(1)=" END
"
  230 menu$(2)=" RE-RUN
"
  240 menu$(3)=" Siren 1
"
  250 menu$(4)=" siren 2
"
  260 menu$(5)=" Siren 3
"
  270 VDU 23,1,0;0;0;0;
  280 LOCAL menuptr,loop
%
  290 *FX 4,1
  300 menuptr=1
  310 PROCdouble(128,18,
"Explanation:")
  320 PROCdouble(128,1,"
Sound Effects Menu")
  330 REPEAT
  340 FOR loop%=min TO m
ING$(len-LEN(m$(loop%)),
" ");
  350 NEXT
  360 COLOUR 1:COLOUR 12
8
  370 key=GET
  380 IF key=139 menuptr
=menuptr-1:IF menuptr=0:
menuptr=max
  390 IF key=138 menuptr
=menuptr+1:IF menuptr=ma
x+1 menuptr=1
  400 UNTIL key=13
  410 *FX4,0
  420 PROCclosewindow(15
,8,len,max+1)
  430 =menuptr
  440 :
  450 DEF PROCclosewindo
w(x,y,len,ht)
  460 VDU 26
  470 GCOL 0,0
  480 PROCopenwindow(x,y
,len,ht)
  490 CLS
  500 VDU 26
  510 GCOL 0,1
  520 ENDPROC
  530 :
  540 DEF PROCopenwindow
(x,y,len,ht)
  550 VDU 28,x,y+ht,x+le
n-1,y
  560 PROCrect(x*32-8,10
16-(y+ht)*32,len*32+12,h
t*32+12,0)
  570 PROCrect(x*32,1008
-(y+ht)*32,len*32+16,8,1
)
  580 PROCrect((x+len)*3
2+8,1008-(y+ht)*32,8,ht*
32+8,1)
  590 ENDPROC
  600 :
  610 DEF PROCrect(x,y,l
,w,f)
  620 MOVE x,y
  630 DRAW x+l,y
  640 IF f=0 DRAW x+l,y+
w ELSE PLOT 85,x,y+w
  650 IF f=0 DRAW x,y+w
ELSE PLOT 85,x+l,y+w
  660 MOVE x,y+w
  670 IF f=0 DRAW x,y EL
SE MOVE x,y
  680 ENDPROC
```

Listing 9. A window menu

```
   10 REM Joe's Jottings
 - listing 9
   20 REM Window menu
   30 REM by Joe Telford
   40 REM for BBC B/B+/M
/E
   50 REM (c) Acorn User
 September 1986
   60 :
   70 DIM m$(10)
   80 ON ERROR *FX 4,0
   90 MODE 4
  100 VDU 19,0,4,0;0;0;
  110 VDU 19,1,3,0;0;0;
  120 REPEAT
  130 choice=FNwmenu("So
und Effects",5,"END","RE
-RUN","Siren 1","Siren 2
","Siren 3","","","","",
"")
  140 IF choice=1 PRINT'
"Ended!":VDU23,1,3;0;0;0
;:END
  150 IF choice=2 RUN
  160 IF choice=3 PROCsi
ren1
  170 IF choice=4 PROCsi
ren2
  180 IF choice=5 PROCsi
ren3
  190 UNTIL FALSE
  200 :
  210 DEF FNwmenu(m$(0),
max,m$(1),m$(2),m$(3),m$
(4),m$(5),m$(6),m$(7),m$
(8),m$(9),m$(10))
  220 LOCAL loop%,menupt
r,len:len=0
  230 FOR loop%=0 TO 10
```

Continued ▶

◄ Joe's listing 9 continued

```
   240 IF LEN(m$(loop%))>
len THEN len=LEN(m$(loop
%))
   250 NEXT
   260 VDU 23,1,0;0;0;0;
   270 *FX 4,1
   280 PROCopenwindow(15,
8,len,max+1)
   290 menuptr=1
   300 REPEAT
   310 PRINTTAB(0,0);
   320 FOR loop%=0 TO max
   330 IF loop%=menuptr O
R loop%=0 COLOUR 0:COLOU
R 129 ELSE COLOUR 1:COLO
UR 128
   340 PRINTm$(loop%);STR
ax
   350 IF loop%=menuptr P
ROCexplain(menuptr):COLO
UR 0:COLOUR 129 ELSE COL
OUR 1:COLOUR 128
   360 PRINTTAB(16,3+loop
%*2);menu$(loop%)
   370 NEXT
   380 COLOUR 1:COLOUR 12
8
   390 PRINT'TAB(5)"Use C
ursor ^ and v to move ba
r"
   400 PRINTTAB(5)"     Pr
ess RETURN to select"
   410 key=GET
   420 IF key=139 menuptr
=menuptr-1:IF menuptr=mi
n-1 menuptr=max
   430 IF key=138 menuptr
=menuptr+1:IF menuptr=ma
x+1 menuptr=min
   440 UNTIL key=13
   450 *FX 4,0
   460 =menuptr
   470 :
   480 DEF PROCexplain(m)
   490 PRINTTAB(0,21);STR
ING$(240," ")
   500 PRINTTAB(0,21);
   510 IF m=1 PRINT"Press
 RETURN now to END this
program."
   520 IF m=2 PRINT"Press
 RETURN now to start thi
s program"'"from the beg
inning."
   530 IF m=3 PRINT"Press
 RETURN now to hear the
first"'"type of siren. T
his uses:"'" ENVELOPE 1,
0,2,-2,2,6,12,6,127,0,0,
-127,126,0"
   540 IF m=4 PRINT"Press
 RETURN now to hear the
second"'"type of siren.
This uses:"'"FOR cycle=1
 TO 10:SOUND1,-15,128,6"
'":SOUND1,-15,110,6:NEXT
cycle"
   550 IF m=5 PRINT"Press
 RETURN now to hear the
third"'"type of siren. T
his uses:"'"ENVELOPE 1,3
,1,1,-2,10,10,0,127,0,0,
-127,126,0"'"Pst....Ever
 heard of Star Trek?"
   560 ENDPROC
```

Listing 10. Four sound off procedures

```
  1000 REM Joe's Jottings
 - listing 10
  1010 REM Four sound eff
ects procedures
  1020 REM by Joe Telford
  1030 REM for BBC B/B+/M
/E
  1040 REM (c) Acorn User
 September 1986
  1050 :
  1060 DEF PROCsiren1
  1070 ENVELOPE 1,0,2,-2,
2,6,12,6,127,0,0,-127,12
6,0
  1080 SOUND 1,1,128,60
  1090 ENDPROC
  1100 :
  1110 DEF PROCsiren2
  1120 FOR cycle=1 TO 10
  1130 SOUND 1,-15,128,6
  1140 SOUND 1,-15,110,6
  1150 NEXTcycle
  1160 ENDPROC
  1170 :
  1180 DEF PROCsiren3
  1190 ENVELOPE 1,3,1,1,-
2,10,10,0,127,0,0,-127,1
26,0
  1200 SOUND 1,1,128,60
  1210 ENDPROC
  1220 :
  1230 DEF PROCphone
  1240 ENVELOPE 1,0,1,1,1
,1,1,1,127,0,0,-127,126,
0
  1250 FOR cycle=1 TO 3
  1260 SOUND 1,1,128,10
  1270 SOUND 1,0,128,6
  1280 SOUND 1,1,128,14
  1290 SOUND 1,0,128,20
  1300 NEXT cycle
  1310 ENDPROC
```


See A-maze-ing, page 88

Listing 1. The "MAZE" game

```
    10 REM Maze
    20 REM David Lawrence
    30 REM BBC B/B+/M/E
    40 REM (c) Acorn User
 September 1986
    50 :
    60 IF PAGE>&1100 THEN
 PROCreloc
    70 :
    80 MODE 1:HIMEM=&2E00
    90 PROCinit
   100 REPEAT
   110 PROCreset
   120 PROCmaze
   130 PROCgame
   140 PROCend
   150 UNTIL done
   160 MODE 7
   170 *FX 200,0
   180 END
   190 :
   200 DEF PROCinit
   210 VDU 19,1,4;0;19,2,
7;0;19,3,4;0;
   220 VDU 23;8202;0;0;0;
   230 DIM D%(4,2),L%(13)
   240 FOR I%=1 TO 4
   250 READ D%(I%,1),D%(I
%,2):NEXT
```

Continued ►

◀ **Lawrence's listing 1 continued**

```
260 FOR I%=1 TO 13:READ L%(I%):NEXT
270 VDU 23,224,255,255,255,255,255,255,255,255
280 VDU 23,225,0,0,0,0,0,0,0,0
290 VDU 23,226,0,0,60,60,60,60,0,0
300 VDU 23,227,129,66,36,24,24,36,66,129
310 VDU 23,228,255,129,189,189,185,189,189,189
320 VDU 23,229,24,60,24,255,153,60,36,102
330 done=FALSE:M%=&2E00
340 rnd=RND(-TIME)
350 *FX 200,1
360 ENDPROC
370 :
380 DEF PROCpoke(xp%,yp%,by%)
390 ?(M%+xp%+yp%*21)=by%
400 ENDPROC
410 :
420 DEF FNpeek(xp%,yp%)
430 =?(M%+xp%+yp%*21)
440 :
450 DEF PROCreset
460 exit=FALSE:box=FALSE:S%=6
470 FOR I%=0 TO 500 STEP 4:I%!M%=0
480 NEXT
490 out=FALSE:f%=1
500 VDU 26,12
510 GCOL 0,2:MOVE 16,16:PLOT 1,0,288
520 PLOT 1,1248,0:PLOT 1,0,-288
530 PLOT 1,-1248,0
540 MOVE 272,16:PLOT 1,0,288
550 COLOUR 2:PRINTTAB(1,30);"Scans:6"
560 ENDPROC
570 :
580 DEF PROCmaze
590 PRINTTAB(0,2)"Please wait, constructing maze>";SPC(99);"<=Finished when";
600 PRINTSPC(27);"arrow gets here.";TAB(30,2);
610 X%=1:Y%=1:xm%=2:ym%=2
620 PROCpoke(2,2,1):N%=99
630 FOR N%=1 TO 99
640 REPEAT:ok%=TRUE
650 REPEAT
660 D%=RND(4):xx%=X%+D%(D%,1)
670 yy%=Y%+D%(D%,2)
680 UNTIL xx%>0 AND xx%<11 AND yy%>0 AND yy%<11
690 IF FNpeek(xx%*2,yy%*2) PROCjump
700 UNTIL ok%
710 FOR I%=1 TO 2
720 PROCpoke(X%*2+I%*D%(D%,1),Y%*2+I%*D%(D%,2),1)
730 NEXT
740 X%=xx%:Y%=yy%:VDU 32,62,8
750 IF X%>xm% xm%=X%
760 IF Y%>ym% ym%=Y%
770 NEXT
780 PROCpoke(RND(10)*2,1,4)
790 X%=RND(10)*2:Y%=20:D%=RND(3)+1
800 REPEAT
810 tx%=RND(10)*2:ty%=RND(10)*2
820 UNTIL tx%<>X% AND ty%<>Y%
830 PROCpoke(tx%,ty%,2)
840 ENDPROC
850 :
860 DEF PROCjump
870 REPEAT
880 X%=RND(xm%):Y%=RND(ym%):ok%=FALSE
890 UNTIL FNpeek(X%*2,Y%*2)
900 ENDPROC
910 :
920 DEF PROCgame
930 TIME=0
940 REPEAT
950 PROCview(X%,Y%,D%)
960 R%=FNpeek(X%,Y%)
970 IF R%=2 PROCboxfound
980 IF R%=4 PROCexitfound
990 IF NOT out PROCmove
1000 UNTIL out
1010 ENDPROC
1020 :
1030 DEF PROCview(x%,y%,d%)
1040 VDU 26,28,0,21,39,0,12,26
1050 VDU 29,640;800;
1060 GCOL 0,2
1070 MOVE 639,200:PLOT 1,0,-680
1080 PLOT 1,-1279,0:PLOT 1,0,680
1090 PLOT 1,1279,0
1100 VDU 24,-634;-476;634;196;
1110 xa%=D%(d%,1):ya%=D%(d%,2)
1120 N%=2:x1%=L%(1)
1130 REPEAT
1140 x2%=L%(N%):R%=FNpeek(x%,y%)
1150 N%=FNroom(x%,y%,d%,R%)
1160 x1%=x2%:x%=x%+xa%:y%=y%+ya%
1170 UNTIL N%=13 OR N%=0
1180 ENDPROC
1190 :
1200 DEF FNroom(x%,y%,d%,R%)
1210 IF R%=0 THEN =0
1220 y1%=-x1%*.75:y2%=-x2%*.75
1230 y3%=x2%*.3125:y4%=x1%*.3125
1240 FOR i%=-1 TO 1
1250 PROCside(x%,y%,i%)
1260 NEXT
1270 IF FNpeek(x%+D%(d%,1),y%+D%(d%,2))=0 PROCendwall
1280 IF R%=2 PROCbox
1290 IF R%=3 PROCcross
1300 IF R%=4 PROCexit
1310 =N%+1
1320 :
1330 DEF PROCside(ax%,ay%,i%)
1340 ax%=ax%+D%(FNturn(d%-i%),1)
1350 ay%=ay%+D%(FNturn(d%-i%),2)
1360 r1%=FNpeek(ax%,ay%)
1370 IF r1%>0 AND i%=0 ENDPROC
1380 IF r1%=0 PROCwall(i%):ENDPROC
1390 PROCopen(i%)
1400 IF r1%=3 PROCsidecross(i%)
1410 ENDPROC
1420 :
1430 DEF FNturn(q%)=(q%+1) MOD 4+1
1440 :
1450 DEF PROCwall(i%)
1460 IF i%=0 ENDPROC
1470 GCOL 0,d%+i%
1480 IF f% MOVE x1%*i%,y1%:MOVE x1%*i%,y4%:PLOT 85,x2%*i%,y2%:PLOT 85,x2%*i%,y3%
1490 GCOL 0,2
1500 MOVE x1%*i%,y1%:DRAW x1%*i%,y4%
1510 DRAW x2%*i%,y3%:DRAW x2%*i%,y2%
1520 DRAW x1%*i%,y1%
1530 ENDPROC
1540 :
1550 DEF PROCendwall
1560 GCOL 0,d%
1570 IF f% MOVE -x2%,y2%:MOVE x2%,y2%:PLOT 85,-x2%,y3%:PLOT 85,x2%,y3%
1580 GCOL 0,2
1590 MOVE -x2%,y2%:DRAW x2%,y2%
1600 DRAW x2%,y3%:DRAW -x2%,y3%
1610 DRAW -x2%,y2%
1620 N%=0
1630 ENDPROC
1640 :
```

Continued ▶

◀ **Listing 1 continued**

```
 1650 DEF PROCopen(i%)
 1660 GCOL 0,d%
 1670 IF f% MOVE x2%*i%,
y2%:MOVE x1%*i%,y2%:PLOT
 85,x2%*i%,y3%:PLOT 85,x
1%*i%,y3%
 1680 GCOL 0,2
 1690 MOVE x2%*i%,y2%:DR
AW x1%*i%,y2%
 1700 DRAW x1%*i%,y3%:DR
AW x2%*i%,y3%
 1710 DRAW x2%*i%,y2%
 1720 ENDPROC
 1730 :
 1740 DEF PROCcross
 1750 GCOL 0,2
 1760 MOVE -x2%,y2%:DRAW
 x1%,y1%
 1770 MOVE -x1%,y1%:DRAW
 x2%,y2%
 1780 ENDPROC
 1790 :
 1800 DEF PROCsidecross(
i%)
 1810 GCOL 0,2
 1820 MOVE x2%*i%,y2%
 1830 DRAW x1%*i%,(7*y2%
+y1%)/8
 1840 ENDPROC
 1850 :
 1860 DEF PROCbox
 1870 GCOL 0,1
 1880 wi=x2%/1.5:he=x2%/
10
 1890 de=x2%/6:ba=x2%/1.
9
 1900 MOVE -wi/2,(y2%+y1
%)/2
 1910 PLOT 0,wi,0
 1920 PLOT 81,-wi,-he:PL
OT 81,wi,0
 1930 PLOT 0,-wi,he:PLOT
 0,wi,0
 1940 PLOT 85,-ba/2,(y2%
+y1%)/2+de
 1950 PLOT 81,ba,0
 1960 GCOL 0,2
 1970 MOVE -wi/2,(y2%+y1
%)/2
 1980 PLOT 1,wi,0
 1990 PLOT 1,0,-he:PLOT
 1,-wi,0
 2000 PLOT 1,0,he
 2010 DRAW -ba/2,(y2%+y1
%)/2+de
 2020 PLOT 1,ba,0:DRAW w
i/2,(y2%+y1%)/2
 2030 ENDPROC
 2040 :
 2050 DEF PROCexit
 2060 IF D%<>3 ENDPROC
 2070 wi=x2%/1.5:he=x2%/
1.2
 2080 GCOL 0,0
 2090 IF f% MOVE -wi/2,y
2%:PLOT 0,wi,0:PLOT 81,-
wi,he:PLOT 81,wi,0
 2100 GCOL 0,2:MOVE -wi/
2,y2%
 2110 PLOT 1,0,he
 2120 PLOT 1,wi,0:PLOT 1
,0,-he
 2130 ENDPROC
 2140 :
 2150 DEF PROCmove
 2160 REPEAT:go%=TRUE:*F
X 21
 2170 REPEAT:k$=GET$
 2180 UNTIL INSTR("FCSZX
:/",k$)
 2190 IF k$="F" f%=1-f%:
SOUND 1,-10,200,1
 2200 IF k$="C" go%=FNdo
cross
 2210 IF k$="S" go%=FNsc
an
 2220 IF k$="Z" D%=D%-1:
IF D%=0 D%=4
 2230 IF k$="X" D%=D%+1:
IF D%=5 D%=1
 2240 IF k$="/" D%=D%+2:
IF D%>4 D%=D%-4
 2250 IF k$= ":" go%=FNf
orward
 2260 UNTIL go%
 2270 ENDPROC
 2280 :
 2290 DEF FNforward
 2300 ax%=X%+D%(D%,1):ay
%=Y%+D%(D%,2)
 2310 IF FNpeek(ax%,ay%)
=0 THEN =0
 2320 X%=ax%:Y%=ay%
 2330 =1
 2340 :
 2350 DEF FNdocross
 2360 p%=FNpeek(X%,Y%)
 2370 IF p%=3 OR p%=4 TH
EN =0
 2380 PROCpoke(X%,Y%,3)
 2390 GCOL 0,2
 2400 MOVE -484,-363:DRA
W 774,-580
 2410 MOVE -774,-580:DRA
W 484,-363
 2420 =0
 2430 :
 2440 DEF FNscan
 2450 LOCAL I%,J%
 2460 IF S%=0 SOUND 1,-1
5,20,1:=0
 2470 S%=S%-1:PRINTTAB(7
,30);S%
 2480 VDU 28,1,30,7,23
 2490 old%=FNpeek(X%,Y%)
 2500 PROCpoke(X%,Y%,5)
 2510 FOR I%=X%-3 TO X%+
3
 2520 FOR J%=Y%-3 TO Y%+
3
 2530 IF I%<1 OR I%>21 O
R J%<1 OR J%>21ch%=225 E
LSE ch%=224+FNpeek(I%,J%
)
 2540 io%=I%-X%+3:jo%=J%
-Y%+3:VDU 31
 2550 IF D%=1 VDU io%,6-
jo%
 2560 IF D%=2 VDU 6-jo%,
6-io%
 2570 IF D%=3 VDU 6-io%,
jo%
 2580 IF D%=4 VDU jo%,io
%
 2590 VDU ch%
 2600 NEXT:NEXT
 2610 VDU 26
 2620 PROCpoke(X%,Y%,old
%)
 2630 =0
 2640 :
 2650 DEF PROCboxfound
 2660 VDU 28,9,30,38,23
 2670 PRINT"Well Done! -
 You have found"'"the tr
easure."'
 2680 IF exit PRINT"Now
get back to the exit aga
in"
 2690 IF NOT exit PRINT"
Now go and find the exit
"

 2700 PRINT'"  Press <SP
ACE> to continue."
 2710 REPEAT
 2720 UNTIL INKEY-99:VDU
 12,26
 2730 box=TRUE:PROCpoke(
X%,Y%,1)
 2740 ENDPROC
 2750 :
 2760 DEF PROCexitfound
 2770 IF exit AND NOT bo
x ENDPROC
 2780 VDU 28,9,30,38,23
 2790 IF box out=TRUE:EN
DPROC
 2800 PRINT"Well Done! -
 You have found"'"the ex
it."'
 2810 PRINT"However, you
 have not found"'"the tr
easure. GO AND FIND IT!"

 2820 PRINT"  Press <SPA
CE> to continue."
 2830 REPEAT
 2840 UNTIL INKEY-99
 2850 VDU 12,26:exit=TRU
E
 2860 ENDPROC
 2870 :
 2880 DEF PROCend
 2890 t%=TIME
 2900 VDU 28,0,21,39,0,1
2,26
 2910 VDU 28,9,21,30,0
 2920 FOR i%=21 TO 1 STE
P -1
 2930 FOR j%=1 TO 21
 2940 VDU 224+FNpeek(j%,
i%)
 2950 NEXT:PRINT
 2960 NEXT
 2970 VDU 28,9,30,38,23
 2980 PRINT"Well Done! -
 You have found"''"the e
xit.  ";
 2990 PRINT"You took >";
t% DIV 360000 MOD 24;":"
;t% DIV 6000 MOD 60;
```

Continued ▶

◀ Lawrence's listing 1 continued

```
 3000 PRINT".";t% DIV 10
0 MOD 60;"<"
 3010 PRINT''"Do you wan
t another game (Y/N)"
 3020 REPEAT
 3030 k$=GET$
 3040 UNTIL k$="Y" OR k$
="N"
 3050 IF k$="N" done=TRU
E
 3060 ENDPROC
 3070 :
 3080 DEF PROCreloc
 3090 PRINT"Relocating..
."
 3100 *TAPE
 3110 *KEY0 FOR X%=0 TO
(TOP-PAGE) STEP 4:X%!&11
00=X%!PAGE:NEXT:PAGE=&11
00|MOLD|MRUN|F|M
 3120 VDU 21:*FX 138,0,1
28
 3130 END
 3140 :
 3150 DATA 0,1,1,0,0,-1,
-1,0
 3160 DATA 774,484,300,2
08,156
 3170 DATA 120,96,76,56,
40,28,16,0
```

See Clever Calligraphy, page 93

Listing 1. Prints out ornamental lettering resembling italic script

```
   10 REM Calligraphy
   20 REM by Mike Turner
   30 REM for BBC B/B+/M
/E with Plus 1
   40 REM and Epson-comp
atible printers
   50 REM (c) Acorn User
 September 1986
   60 :
   70 ON ERROR PROCerror
   80 MODE 6
   90 VDU 19,1,2,0,0,0
  100 *FX 15,1
  110 font$=CHR$(32)+"AB
CDEFGHIJKLMNOPQRSTUVWXYZ
"
  120 fullwidth=960
  130 n1=fullwidth MOD 2
56
  140 n2=fullwidth DIV 2
56
  150 INPUTTAB(0,10)"Nam
e of file to be printed?
"file$
  160 c=OPENUP(file$)
  170 REPEAT
  180 PROCfile
  190 PROCcontrols
  200 PROCswitchon
  210 PROClinespace
  220 PROCcentre
  230 PROClayout
  240 FOR section%=1 TO
4
  250 strikes%=0
  260 PROCgrafix
  270 PROCfill(lead)
  280 PROCstrip(writing$
)
  290 VDU 1,13,1,10
  300 NEXT
  310 UNTIL EOF#c
  320 CLOSE#c
  330 VDU 3
  340 END
  350 :
  360 DEF PROCswitchon
  370 VDU 2,1,27,1,64
  380 ENDPROC
  390 :
  400 DEF PROClinespace
  410 VDU 1,27,1,ASC("A"
),1,8
  420 ENDPROC
  430 :
  440 DEF PROCcentre
  450 sp=0
  460 spaces%=fullwidth
  470 strikes%=0
  480 FOR N%=1 TO LEN(wr
iting$)
  490 PROCletter
  500 IF letter$=CHR$(32
) THEN sp=sp+1
  510 PROCskip
  520 READ width%
  530 spaces%=spaces%-wi
dth%
  540 NEXT
  550 ENDPROC
  560 :
  570 DEF PROCletter
  580 letter$=MID$(writi
ng$,N%,1)
  590 IF INSTR(font$,let
ter$)=0 THEN letter$=CHR
$(32)
  600 ENDPROC
  610 :
  620 DEF PROCgrafix
  630 VDU 1,27,1,ASC("L"
),1,n1,1,n2
  640 ENDPROC
  650 :
  660 DEF PROCstrip(w$)
  670 FOR N%=1 TO LEN(w$
)
  680 PROCletter
  690 PROCskip
  700 PROCprint
  710 NEXT
  720 right%=fullwidth-s
trikes%
  730 IF right%>0 THEN P
ROCfill(right%)
  740 ENDPROC
  750 :
  760 DEF PROCrestore
  770 PROCskip
  780 IF section%=1 OR s
ection%=4 OR ASCletter$=
32 ENDPROC
  790 PROCskipline(secti
on%-1)
  800 ENDPROC
  810 :
  820 DEF PROCfill(j%)
  830 IF j%=0 THEN ENDPR
OC
  840 FOR data%=1 TO j%
  850 VDU 1,0
  860 strikes%=strikes%+
1
  870 NEXT
  880 ENDPROC
  890 :
  900 DEF PROCprint
  910 PROCrestore
  920 READ width%
  930 IF letter$=CHR$(32
) THEN PROCfill(spaces%)

  940 IF section%=4 THEN
 PROCfill(width%):ENDPRO
C
  950 FOR data=1 TO widt
h%
  960 READ dots$
  970 dots$="&"+dots$
  980 dots%=EVAL(dots$)
  990 VDU 1,dots%
 1000 strikes%=strikes%+
1
 1010 NEXT
 1020 ENDPROC
 1030 :
 1040 DEF PROCcontrols
 1050 lj=0:rj=0:ce=0:ms=
0:control$=""
 1060 IF LEFT$(writing$,
1)=CHR$(128) THEN contro
l$=MID$(writing$,2,2):co
ntrol=TRUE ELSE lj=TRUE:
control=FALSE
 1070 IF control THEN wr
iting$=MID$(writing$,4)
 1080 ENDPROC
 1090 :
 1100 DEF PROClayout
 1110 IF control$="LJ" T
HEN lj=TRUE
 1120 IF control$="RJ" T
HEN rj=TRUE
 1130 IF control$="CE" T
HEN ce=TRUE
 1140 IF control$="MS" T
HEN ms=TRUE
 1150 IF lj THEN lead=0:
spaces%=0
 1160 IF rj THEN lead=sp
aces%:spaces%=0
 1170 IF ce THEN lead=sp
aces% DIV 2:spaces%=0
```

Continued ▶

◀ **Listing 1 continued**

```
 1180 IF ms THEN lead=0:
spaces%=spaces% DIV sp
 1190 ENDPROC
 1200 :
 1210 DEF PROCfile
 1220 writing$=""
 1230 REPEAT
 1240 x=BGET#c
 1250 IF x<>13 THEN writ
ing$=writing$+CHR$(x)
 1260 UNTIL x=13
 1270 ENDPROC
 1280 :
 1290 DEF PROCskip
 1300 char%=ASCletter$
 1310 RESTORE
 1320 IF char%<65 ENDPRO
C
 1330 PROCskipline(1)
 1340 IF char%=65 ENDPRO
C
 1350 FOR c%=0 TO (char%
-66)
 1360 PROCskipline(3)
 1370 NEXT
 1380 ENDPROC
 1390 :
 1400 DEF PROCskipline(n
%)
 1410 FOR line%=1 TO n%
 1420 READ w%
 1430 FOR k%=1 TO w%:REA
D d$
 1440 NEXT:NEXT
 1450 ENDPROC
 1460 :
 1470 DEF PROCerror
 1480 CLOSE#0
 1490 VDU 3
 1500 PRINT:REPORT:PRINT
" at line ";ERL
 1510 END
 1520 :
 1530 REM space
 1540 DATA 16,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0
 1550 :
 1560 REM A
 1570 DATA 22,0,0,0,0,0,
0,0,0,1,7,1C,70,F0,FF,FF
,F,0,0,0,0,0,0
 1580 DATA 22,0,0,0,0,1,
7,1F,73,C3,3,3,3,3,3,F3,
FF,FF,F,0,0,0,0
 1590 DATA 22,1,7,1C,70,
C0,80,80,80,80,80,80,80,
80,80,80,80,F0,FF,FF,F,1
,2
 1600 :
 1610 REM B
 1620 DATA 21,0,10,3F,7F
,FF,30,60,60,C0,C0,C0,C0
,C0,C0,C0,E3,FF,7F,3C,0,
0
 1630 DATA 21,0,FF,FF,FF
,30,30,30,30,30,30,30,30
,30,78,FC,DC,9E,F,7,3,0
 1640 DATA 21,FF,FF,FF,E
,7,3,3,3,3,3,3,3,3,7,F
,1E,FC,F8,F0,0
 1650 :
 1660 REM C
 1670 DATA 19,0,1,7,1F,1
C,38,70,60,E0,C0,C0,C0,C
0,C0,E0,F0,7F,3E,1C
 1680 DATA 19,7F,FF,FF,0
,0,0,0,0,0,0,0,0,0,0,0,8
0,0,0,0
 1690 DATA 19,F8,FC,FE,1
F,F,7,3,3,3,3,3,7,7,E,1C
,38,60,80,0
 1700 :
 1710 REM D
 1720 DATA 22,0,0,40,C0,
FF,FF,FF,C0,C0,C0,C0,C0,
C0,C0,C0,C0,E0,F0,F8,7F,
3F,1F
 1730 DATA 22,0,0,0,FF,F
F,FF,0,0,0,0,0,0,0,0,0,0
,0,0,0,FF,FF,FE
 1740 DATA 22,1,3,FF,FF,
FF,3,3,3,3,3,3,3,3,7,6,E
,1C,38,F0,E0,80,0
 1750 :
 1760 REM E
 1770 DATA 23,0,10,20,60
,FF,FF,FF,E0,E0,E0,E0,E0
,E0,E0,E0,E0,E0,E0,E0,E0
,E0,C0,80
 1780 DATA 23,0,10,30,7F
,FF,FF,F0,70,70,70,70,70
,60,40,0,0,0,0,0,0,0,0,0
 1790 DATA 23,1,3,7F,FF,
FF,87,7,7,7,7,7,7,7,7,7,
7,7,7,7,7,6,4,8
 1800 :
 1810 REM F
 1820 DATA 23,10,20,60,F
F,FF,FF,E0,E0,E0,E0,E0,E
0,E0,E0,E0,E0,E0,E0,E0,E
0,E0,C0,80
 1830 DATA 23,10,30,7F,F
F,FF,F0,70,70,70,70,70,7
0,60,40,0,0,0,0,0,0,0,0,
0
 1840 DATA 23,0,7F,FF,FF
,81,2,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0
 1850 :
 1860 REM G
 1870 DATA 20,0,1,7,1F,1
C,38,70,60,E0,C0,C0,C0,C
0,C0,E0,F0,7F,3E,1C,0
 1880 DATA 20,7F,FF,FF,0
,0,0,0,0,2,4,C,1C,1C,1C,
1C,1C,1F,1F,1F,0
 1890 DATA 20,F8,FC,FE,1
F,F,7,3,3,3,3,3,7,6,E,1C
,7F,FF,FF,81,2
 1900 :
 1910 REM H
 1920 DATA 20,0,10,3F,7F
,FF,0,0,0,0,0,0,0,0,0,0,
0,10,3F,7F,FF
 1930 DATA 20,0,7F,FF,FF
,B8,38,38,38,38,38,38,38
,38,38,38,38,7F,FF,FF,80
 1940 DATA 20,7F,FF,FF,8
0,0,0,0,0,0,0,0,0,0,0,0,
7F,FF,FF,81,2
 1950 :
 1960 REM I
 1970 DATA 15,0,0,10,20,
60,E0,E0,FF,FF,FF,E0,E0,
E0,C0,80
 1980 DATA 15,0,0,0,0,0,
0,7F,FF,FF,80,0,0,0,0,0
 1990 DATA 15,1,3,7,7,7,
7F,FF,FF,87,7,6,4,8,0,0
 2000 :
 2010 REM J
 2020  DATA 24,0,0,10,20
,60,E0,E0,E0,E0,E0,E0,E0
,E0,E0,FF,FF,FF,E0,E0,E0
,E0,E0,C0,80
 2030 DATA 24,0,0,0,0,0,
0,0,0,0,0,0,0,0,FF,FF,FF
,0,0,0,0,0,0,0,0
 2040 DATA 24,2,6,F,1F,7
,3,3,3,3,3,3,6,E,F8,F0,8
0,0,0,0,0,0,0,0,0
 2050 :
 2060 REM K
 2070 DATA 19,0,10,3F,7F
,FF,0,0,0,0,0,1,3,6,C,18
,30,60,C0,80
 2080 DATA 19,0,FF,FF,FF
,6,C,18,30,60,F8,FE,1F,7
,1,0,0,0,0,0
 2090 DATA 19,FF,FF,FF,0
,0,0,0,0,0,0,0,80,E0,F8,
7E,1F,7,1,2
 2100 :
 2110 REM L
 2120 DATA 22,0,0,0,10,3
F,7F,FF,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0
 2130 DATA 22,0,0,0,7F,F
F,FF,80,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0
 2140 DATA 22,1,3,7F,FF,
FF,87,7,7,7,7,7,7,7,7,7,
7,7,7,7,6,4,8
 2150 :
 2160 REM M
 2170 DATA 27,0,10,3F,7F
,FF,C,18,30,60,C0,C0,C0,
E0,7F,7F,3F,C,18,30,60,C
0,C0,C0,E0,FF,7F,3F
 2180 DATA 27,0,FF,FF,FF
,0,0,0,0,0,0,0,0,FF,FF,F
F,0,0,0,0,0,0,0,0,FF,FF,
FF,0
 2190 DATA 27,FF,FF,FF,0
,0,0,0,0,0,0,0,FF,FF,FF,
0,0,0,0,0,0,0,0,FF,FF,FF
,2,4
 2200 :
 2210 REM N
 2220 DATA 21,0,10,3F,7F
,FF,6,C,18,30,60,E0,C0,C
0,C0,C0,C0,E0,FF,7F,3F,0
 2230 DATA 21,0,FF,FF,FF
,0,0,0,0,0,0,0,0,0,0,0,0
,FF,FF,FF,0,0
 2240 DATA 21,FF,FF,FF,0
,0,0,0,0,0,0,0,0,0,0,0,F
F,FF,FF,1,2,0
 2250 :
```

Continued ▶

◄ **Turner's listing 1 continued**

```
 2260 REM O
 2270 DATA 21,0,1,7,1F,1
C,38,70,60,E0,C0,C0,C0,C
0,C0,E0,F0,F8,7F,3F,1F,0
 2280 DATA 21,7F,FF,FF,0
,0,0,0,0,0,0,0,0,0,0,0,0
,0,FF,FF,FE,0
 2290 DATA 21,F8,FC,FE,1
F,F,7,3,3,3,3,3,7,6,E,C,
38,F8,E0,80,0,0
 2300 :
 2310 REM P
 2320 DATA 20,0,10,3F,7F
,FF,1C,30,60,60,C0,C0,C0
,C0,C0,C0,E0,78,7F,1F,F
 2330 DATA 20,0,7F,FF,FF
,8C,6,6,3,3,3,3,6,6,6,C,
18,78,F0,E0,80
 2340 DATA 20,FF,FF,FF,C
1,2,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0
 2350 :
 2360 REM Q
 2370 DATA 24,0,1,7,1F,3
C,30,70,60,E0,C0,C0,C0,C
0,C0,E0,F0,F8,7F,3F,1F,0
,0,0,0
 2380 DATA 24,7F,FF,FF,0
,0,0,0,0,0,1,1,1,1,0,0,0
,0,FF,FF,FE,0,0,0,0
 2390 DATA 24,F8,FC,FE,1
F,F,7,3,43,83,83,83,C7,E
6,FE,7C,3C,FE,EF,87,3,3,
2,2,C
 2400 :
 2410 REM R
 2420 DATA 20,0,10,3F,7F
,FF,30,60,E0,C0,C0,C0,C0
,C0,C0,E0,F0,7F,3F,1F,0
 2430 DATA 20,0,FF,FF,FF
,18,18,18,18,18,18,18,18
,3C,3E,6F,E7,C3,80,0,0
 2440 DATA 20,FF,FF,FF,0
,0,0,0,0,0,0,0,0,0,0,E0,
FF,FF,1F,1,2
 2450 :
 2460 REM S
 2470 DATA 20,0,0,F,1F,3
F,38,70,60,E0,C0,C0,C0,C
0,C0,E0,F0,7F,3E,1C,8
 2480 DATA 20,0,0,80,C1,
E0,E0,60,70,30,30,18,18,
1C,C,E,7,7,3,1,0
 2490 DATA 20,3C,7E,FF,F
,7,3,3,3,3,3,3,3,3,7,7,1
E,FC,F8,F0,0
 2500 :
 2510 REM T
 2520 DATA 24,10,20,60,E
0,E0,E0,E0,E0,E0,E0,FF,F
F,FF,E0,E0,E0,E0,E0,E0,E
0,E0,E0,C0,80
 2530 DATA 24,0,0,0,0,0,
0,0,0,0,FF,FF,FF,0,0,0,0
,0,0,0,0,0,0,0,0
 2540 DATA 24,0,0,0,0,0,
0,0,0,FF,FF,FF,0,0,0,0,0
,0,0,0,0,0,0,0,0
 2550 :
 2560 REM U
 2570 DATA 20,0,10,3F,7F
,FF,0,0,0,0,0,0,0,0,0,0,
0,10,3F,7F,FF
 2580 DATA 20,1,FF,FF,FE
,0,0,0,0,0,0,0,0,0,0,0,1
,FF,FF,FE,0
 2590 DATA 20,F0,FC,FE,1
F,7,3,3,3,3,3,7,6,C,18,3
8,FF,FF,FF,1,2
 2600 :
 2610 REM V
 2620 DATA 18,10,30,7F,F
F,F,0,0,0,0,0,0,0,0,0,3,
E,38,E0
 2630 DATA 18,0,0,0,F0,F
F,FF,F,0,0,0,3,E,38,E0,8
0,0,0,0
 2640 DATA 18,0,0,0,0,F0
,FF,FF,F,38,E0,80,0,0,0,
0,0,0,0
 2650 :
 2660 REM W
 2670 DATA 26,10,30,7F,F
F,F,0,0,10,30,7F,FF,F,0,
0,0,0,0,0,0,0,0,0,3,E,38
,E0
 2680 DATA 26,0,0,0,F0,F
F,FF,F,0,0,0,F0,FF,FF,F,
0,0,0,0,3,E,38,E0,80,0,0
,0
 2690 DATA 26,0,0,0,0,0,
F0,FF,FF,F,38,E0,80,F0,F
F,FF,F,38,E0,80,0,0,0,0,
0,0,0
 2700 :
 2710 REM X
 2720 DATA 24,0,0,80,C0,
F0,F8,7E,3F,F,7,1,0,0,0,
0,0,1,3,6,C,18,30,60,C0
 2730 DATA 24,0,0,0,0,0,
0,0,0,C1,E3,F6,FE,3F,3F,
67,C1,80,0,0,0,0,0,0,0
 2740 DATA 24,1,3,6,C,18
,30,60,C0,80,0,0,0,0,C0,
E0,F8,FE,3F,F,7,1,0,0,0
 2750 :
 2760 REM Y
 2770 DATA 19,11,3F,7F,F
E,0,0,0,0,0,0,0,0,0,0,0,
11,3F,7F,FE
 2780 DATA 19,F8,FE,FF,7
,3,1,1,1,1,1,1,3,6,C,18,
FF,FF,FF,0
 2790 DATA 19,0,0,0,2,86,8
F,9F,87,83,83,83,83,83,3
,6,E,FC,F0,80,0
 2800 :
 2810 REM Z
 2820 DATA 24,0,0,0,10,2
0,60,E0,E0,E0,E0,E0,E0,E
0,E0,E1,E3,E6,EC,F8,F0,E
0,C0,80,0
 2830 DATA 24,0,0,0,0,0,
0,0,0,3,7,C,18,30,E0,C0,
0,0,0,0,0,0,0,0,0
 2840 DATA 24,1,3,7,F,1F
,37,67,C7,87,7,7,7,7,7,7
,7,7,7,7,7,7,7,6,4,8
```

Listing 2. Creates a file of text for listing 1

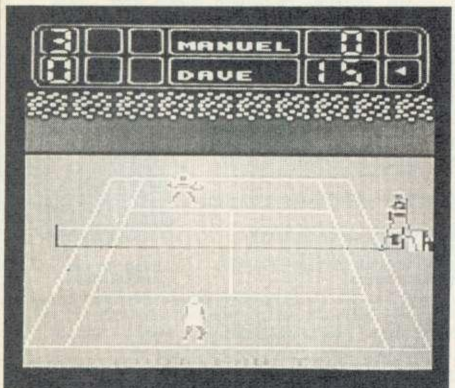
```
   10 REM Calligraphy Fi
le Creator
   20 REM by Mike Turner
   30 REM for BBC B/B+/M
/E
   40 REM (c) Acorn User
 September 1986
   50 :
   60 ON ERROR CLS:CLOSE
#0:REPORT:PRINT" at line
 ";ERL:END
   70 MODE 3
   80 VDU 19,1,2,0,0,0
   90 REPEAT
  100 INPUTTAB(0,10) "Nu
mber of lines of print (
max 22) "lines
  110 UNTIL lines<=22 AN
D lines>0
  120 DIM entry$(lines)
  130 VDU 19,1,2,0,0,0
  140 FOR N%=1 TO lines
  150 REPEAT
  160 PRINT "Line ";N%;"
:-";
  170 INPUT LINE entry$(
N%)
  180 IF LEN(entry$(N%))
>60 THEN VDU7:PRINT "Lin
e too long - try again"
  190 UNTIL LEN(entry$(N
%))<=60
  200 NEXT
  210 VDU 7
  220 PRINT"Page complet
ed"
  230 INPUT"Name of file
 to be saved",file$
  240 g=OPENOUT file$
  250 REPEAT
  260 FOR N%=1 TO lines
  270 FOR letter=1 TO LE
N(entry$(N%))
  280 IF entry$(N%)="" T
HEN entry$(N%)=CHR$(32)
  290 byte$=MID$(entry$(
N%),letter,1)
  300 byte=ASC(byte$)
  310 IF byte>128 THEN b
yte=128
  320 BPUT#g,byte
  330 NEXT letter
  340 BPUT#g,&D
  350 NEXT N%
  360 CLOSE#g
  370 VDU 7
  380 PRINT"File saved a
s <";file$;">"
  390 END
```

CHARTS

Check out the latest position of your favourite game

TOP 20 BBC MICRO GAMES

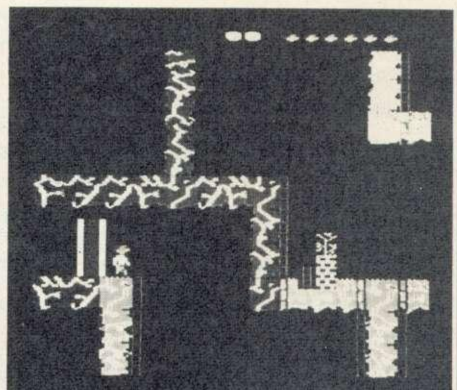
Title	Publisher	Cassette	Disc	B+	Master	Reviewed
1 (1) Commando	Elite	£9.95	£14.95	*	*	August '86
2 (3) Tennis	Bug-Byte	£2.99	–	*	*	September '86
3 (2) Winter Olympics	Tynesoft	£9.95	–	*	*	September '86
4 (4) Bruce Lee	US Gold	£9.95	£14.95	No	No	August '86
5 (5) Karate Combat	Superior	£8.95	£11.95	Yes	Yes	July '86
6 (–) Jack Attac	Bug-Byte	£2.99	–	(a)	(a)	September '86
7 (–) Galactic Patrol	Mastertronic	£1.99	–	No	No	–
8 (–) Jet Set Willy	Tynesoft	£7.95	£9.95	Yes	Yes	–
9 (11) Yie Ar Kung Fu	Imagine	£9.95	£12.95	No	No	March '86
10 (6) Phanton Combat	Doctor Soft	£9.95	£11.95	Yes	Yes	February '86
11 (7) Citadel	Superior	£9.95	£11.95	Yes	*	March '86
12 (8) Computer Hits 10 Vol 2	Beau Jolly	£9.95	–	Yes	No	–
13 (14) Cosmic Battle Zones	US Gold	£9.95	–	No	No	–
14 (–) Great Wall	Artic	£1.99	–	*	*	–
15 (12) Repton 2	Superior	£9.95	£11.95	Yes	*	December '85
16 (16) Combat Lynx	Durell	£8.95	–	Yes	*	September '85
17 (–) Savage Pond	Bug-Byte	2.99	–	(a)	(a)	–
18 (–) Star Force 7	Bug-Byte	£2.99	–	Yes	*	–
19 (–) Dr Who and the Mines of Terror	Micropower	(b)	(b)	No	No	March '86
20 (–) Ian Botham Test Cricket	Tynesoft	£7.95	£11.95	Yes	Yes	–



Tennis: this month's no. 2



Beneath the surface of the Savage Pond


Highest new entry: Jack Attac

TOP 10 ELECTRON GAMES

Title	Publisher	Cassette	Disc	Reviewed
1 (–) Galactic Patrol	Mastertronic	£1.99	–	–
2 (1) Commando	Elite	£9.95	£14.95	August '86
3 (2) Computer Hits 10 Vol 2	Beau Jolly	£9.95	–	–
4 (5) Tennis	Bug-Byte	£2.99	–	September '86
5 (–) Jet Set Willy	Tynesoft	£7.95	£9.95	–
6 (–) Jack Attac	Bug-Byte	£2.99	–	September '86
7 (3) Yie Ar Kung Fu	Imagine	£9.95	£12.95	March '86
8 (–) Savage Pond	Bug-Byte	£2.99	–	–
9 (4) Way of the Exploding Fist	Melbourne House	£9.95	–	April '86
10 (6) Walk the Plank	Mastertronic	£1.99	–	–

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*PLEASE CHECK B+/MASTER COMPATIBILITY BEFORE BUYING; (a) PROGRAM NEEDS CONVERTING; (b) INCLUDES 16k ROM

REVIEWS

GAMES

A BLAST OF FUN



'Deathstar', Superior, BBC B/B+, £9.95 (cassette), £11.95 (disc). Version reviewed: BBC B

There's nothing particularly novel about this piece of software, but it's written to the high standards we've come to expect from Superior, is enjoyable to play and has a high addiction factor despite its lack of originality.

It's a high-speed arcade game that revolves around a revolving space ship. You use two keys to spin it clockwise or anti-clockwise, *Asteroids*-style. Left to its own devices, it will accelerate off in whatever direction it's pointing, whereupon the screen scrolls impressively smoothly. Your spacecraft shares the cosmos with some lumpy planetoids, some nasty red Worker ships and some even nastier blue Warrior ships. Their job is to collect crystals from the planetoids with which to build a Deathstar, an unsightly object which will try to annihilate you. Your job is to collect the same crystals to make Starbombs, which are your only defence against the Deathstar. You mine crystals by blasting the planetoids with a laser, which also comes in handy for blasting Workers and Warriors.

That's about all there is to it, rotating and blasting. Doesn't sound like much fun, does it? But it is. For one thing, everything happens pretty fast, and it's a real white-knuckle job keeping your little ship under control and firing your laser. For another thing, there's a constant tactical problem to resolve.

The mode 5 graphics are as elegant as they need to be, and the animation is as zippy as the sound is zappy. Although there's nothing surprising or revolutionary about *Deathstar*, it's a neat demonstration that an old formula, when cleverly handled, can still produce a thoroughly enjoyable game.

Jeffery Pike

KNOCKOUT IT'S NOT



'Tennis', Bug-byte, BBC B/B+/Master/ Electron, £2.99 (cassette only). Version reviewed: Electron

As a tennis fan I was delighted to receive this game but soon discovered that, despite its success in the software charts, this was a case where low price meant low quality.

The inlay card promises five opponents of reputedly increasing skill, but I haven't yet seen anyone get past the first round opponent, Manual Fawlty. Your viewpoint is from behind your own player who's controlled with four directional keys plus Space to hit the ball.

In theory the game sounds promising – all the expected facilities seem to be here: a ball boy to collect stray shots (always mine), a giant electronic scoreboard, sound and 3D graphics. However, this is the kind of program which gives budget games a bad name – the graphics are crude and unconvincing mode 5 chunks, there's no two player option, the use of sound is indescribably poor, and, worst of all, the response from the keyboard is pathetic.

Maybe, I thought, things would get better with practice. And here *Tennis* proved its complete lack of potential – the game is not only utterly boring, it's also so difficult, in both Electron and BBC versions, that I didn't manage to win a single game.

By then I think even the micro had had enough. I certainly had.

Bernard Emblem

UNINSPIRED POND LIFE



'Savage Pond', Bug-Byte, BBC B and Electron, £2.99 (cassette). Version reviewed: BBC B

Savage Pond is a poor attempt at making something out of nothing. The game is really a simple arcade game that involves you in little more than whizzing around the screen trying to avoid some blobs and hit others.

The scenario is anything but simple and explained very badly in the cassette sleeve notes. You are a tadpole. Not surprisingly you are very pro-frog. The idea is to build up a colony of frogs in the local pond.

It's all very educational. You have to eat worms and amoeba and avoid the stinging hydra and the dragonfly nymphs. Dragonflies doing flypasts drop eggs which you must knock off before they hatch and other equally fascinating events occur in the busy life of the pond. Even mankind gets a look-in by dumping radioactive waste.

It is true that the screen display in this game is very pretty (though rather reminiscent of a David Bellamy programme) and the movement of all the various characters is smooth and responsive to the control of both joystick and keyboard. The colours are vibrant, the characters well designed, and so on. However, the game itself is totally uninspiring.

Bug-Byte was a big name in games software about two years ago – and not just for the BBC micro market. The name died out but has been resurrected by Argus Software. If *Savage Pond* is a typical example of the kind of material behind the comeback I suspect we shall not be hearing much more from them.

Geoff Bains

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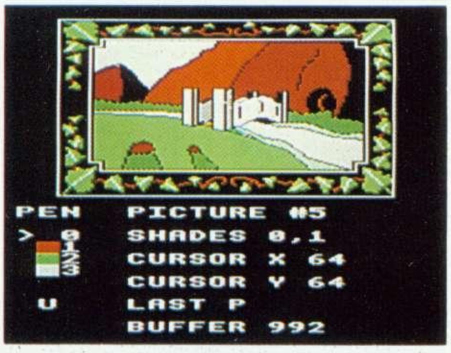
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REVIEWS

SOFTWARE

RECOMMENDED ADVENTURE



'The Graphic Adventure Creator', Incentive Software, BBC B and B+, £22.95 (cassette), £27.95 (disc). Version reviewed: BBC B

Ever felt you had a great idea for an adventure but were put off by the programming? Incentive Software has come up with the answer by producing – in effect – a programming language specifically for adventures.

That's perhaps overstating it a little. What the program does is to allow you to build up the substance of an adventure – the commands, the descriptions, objects and events, while taking care of the nitty-gritty.

The software handles things like the language parser – which makes sense of what the player types in. It also allows you to build up the plan of the adventure very easily. Creating a room is a simple matter of giving it a number, writing a description and then saying what exits there are.

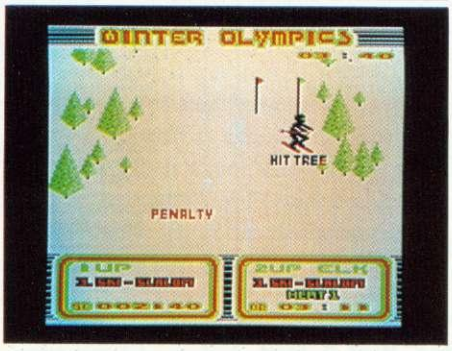
You can also assign a screen display to each room. These are created with a simple artist program and stored in a separate file. You also give the system a list of words, including verbs, adverbs, nouns, objects and so on. Then comes the clever part. You can write rules associated with the words, the objects and the room, so that quite complex interactions can be built up. The method of creating the rules is faintly reminiscent of Prolog.

Tricky things, such as routines to save and load the current game position, and linking rooms and objects, are all handled by the system. At any time you can save the adventure to disc or tape so that you can resume work on it later. And when the game is finished it is saved as a stand-alone file, which is started by typing *RUN <filename>.

There are many sophisticated features to this program. The important thing, however, is that it frees adventure writers from the drudgery of coding and allows them to concentrate on the imaginative and creative side of the process. Highly recommended.

Steve Mansfield

FIVE-MINUTE WONDER



'Winter Olympics', Tynesoft, BBC B and Electron, £7.95 (cassette), £11.95 (disc). Version reviewed: BBC B

I was looking forward to this game, eagerly anticipating the stunning scenery of the Alps and the terrifying thrills of some of the fastest sports on Earth.

Sadly, it didn't happen. The scenery is virtually non-existent, with just one recognisable mountain throughout the whole of the five events.

As for the thrills – well, the games do get fast sometimes. But the graphics are too jerky and awkward to make you feel you're ever really in control.

The first event is speed skating. If you're playing by yourself, ignore your opponent as he's just there for decoration (if you can call the simple graphics decorative).

Next up is the ski jump. The action is thankfully short-lived here, but at least the mountain in the background is pretty. The next event is the ski slalom, where you have to aim between the flags. Then comes the downhill ski-ing, which is more of the same but without the flags and with a few more trees.

You're now on the Cresta Run. Two graphics are used here – a small and crude 3D window on the run, and a map showing your progress. Again the graphics are jerky and, when you crash, positively ridiculous.

For me, there was a five-minute wonder. I was amused the first time through, but quickly got bored. And the constant reloading of events was a real pain.

Steve Mansfied

HAPPY EVER AFTER



'Jack Attac', Bug-Byte, BBC B and Electron, £2.99 (cassette). Version reviewed: BBC B

The Jack of the title is he of beanstalk fame. As Jack, you have to run around the beanstalk and the giant's castle to rescue your sweetheart, Jill (a sad case of mixed-up nursery rhymes, this). Now, I tell you all this because you'd never guess it from the screen picture.

Plot aside (and who can seriously say they buy a computer game for the plot?) *Jack Attac* is fun enough. It's fairly standard stuff. There is a seemingly endless supply of screens, all interconnected and filled with an assortment of ladders and platforms and the odd nasty. Jack must trot around these searching for Jill. Of course, some parts of this maze of bean foliage are blocked from Jack's path by locked doors and so Jack must find the keys for these first.

Once the final key is found the giant wakes up and Jack must rescue Jill, escape from the castle and climb down the beanstalk all in two minutes, before he can get down to the serious matter of living happily ever after.

So, let's face it, there's nothing very new here. However, it works. There is a strange addictive quality about games like this. The movement of Jack and the few moving baddies which infest the beanstalk is very slick and the controls nice and responsive. It's true that the whole game did crash once, insisting on drawing every screen on top of another (not a pretty sight) but that all adds to the excitement.

Jack Attac's standard of presentation is laughable. There are mistakes on the cassette sleeve and in the game's opening pages and Bug-Byte can't seem to decide if it's 'Attac' or 'Attack'. I can't give full marks for a game with these kind of errors and such a lack of originality, but it's cheap and fun to play.

Geoff Bains

REVIEWS

SOFTWARE

INDEX YOUR VIEW TEXT

```
FJ .......*.......*.......*.......*.(
   bold text                                13
   creation of an index                      1
   double highlight 1 codes               6,13
   EDIT                                      3
   Extended highlight sequences             12
   filenames                                 4
   final index                              11
   Highlight 1 codes                       8,9
   index entries                           1,8
   index entries in text files               6
   intermediate index                        1
   intermediate index file                 1,4
   Length of index entries                  11
   maximum index entry length               12
   output format                            11
   page number                               1
   practical maximum length                 11
   Preparing the document text               3
   printer drivers                          15
   text files                                1
   unbroken sequences of highlight codes    15
   underlining                               8
   VIEW text file                            1
   ViewIndex printer driver                  1
```

'ViewIndex', Acornsoft, BBC B/B+/Master, £14.95 (disc)

ViewIndex is a comprehensive program which allows authors of large documents to create an index more quickly than by the usual, manual, methods. This disc-based package creates an index either by page numbers or section numbers (in the form 1.5.2).

To allow *ViewIndex* to recognise the words or phrases it will include, a double HIGHLIGHT 1 is used to mark each string in turn. Strings may be up to 50 characters long. Only marked entries are included in the list, all other occurrences of the string are ignored. It is worth mentioning that it is prudent to enter the index highlights as the text is being created. I used a very long document to test the package's capabilities and it was tedious to enter the markers – though still more efficient than doing it all manually. However, if word-marking is part of the writing process it becomes far simpler. One further point: *ViewIndex* is not intelligent so any strings which contain punctuation marks will be listed complete with incumbent punctuation. Similarly, if the text contains several references to the same point, each worded slightly differently, these will be in different parts of the index.

ViewIndex contains two template files: one for index by page numbers and one for index by section numbers. By loading the *ViewIndex* printer driver (PRINTER INDEX), and asking it to 'print' all the document files, an intermediate index file is created. Once the file is built it is then read, sorted, multiple entries merged and the whole thing written out to a final index *View* file. The *ViewIndex* sort file also contains options for formatting and presenting the final layout of the index. Creating a page number index is very simple indeed. The section number index requires a macro to be called at the start of each chapter, section and sub-section.

Apart from the lengthy marking process, the creation of an index takes remarkably little time. Once the text was marked, it took about five minutes to create a four-page index from a 30-page document. In addition to being very quick *ViewIndex* is a very 'user-friendly' package. The accompanying 22-page manual is a model of clarity (part of it appears on the disc as a text file to help you get to grips with the package). In no time at all I became proficient and confident with the program.

ViewIndex is excellent, and it is a very valuable addition to the *View* suite of integrated software. Acornsoft has produced a totally professional piece of software.

Chris Drage

KEEP TRACK OF YOUR FILES

'Discdex', Clares, BBC B/B+/Master, £15 (disc)

Discdex is a versatile disc-indexing and cataloguing system which enables the user to keep track of programs and other files. It acts as a database in that it's possible to search through the records of your disc catalogue for given filenames and the end result will be printed complete with disc number, side and directory. Moreover, there is a utility for printing disc labels which may be done in a variety of print sizes, bearing in mind that 32 files on one label will be cramped.

The operation of the program is almost totally automatic. All the user needs to do is to feed the discs into the drive and press the space bar. The catalogue is retained in memory and then committed to disc when the data collection is finished.

The results of this information gathering may then be presented in a number of forms. For example, the user may need an alphabetic index to all files in the collection for a disc-by-disc index of what is contained on the surfaces. The various files may be split into sub-indexes so that games could be in catalogue G and word-processing files in catalogue W. Disc numbering labels are provided as well as address-type labels on to which you can print out the disc information.

I found that not only was this program exceptionally easy to use but also that it gave me a facility I had never thought about before. The Evans collection of discs has never been so well ordered and, what's more, as the collection grows I shall be able to update my index by editing the index file.

All in all an excellent utility which will save people many headaches. Well done, Clares!

Nick Evans

PARLEZ FRANÇAIS AVEC LE MICRO

'Granville – the Prize Holiday Package', Cambridge Micro Software, BBC B/B+/Master, £28.70 (disc)

This is a French teaching package, consisting of a manual that looks more like a holiday brochure than a school text, book, and a disc packed with exciting situations in which learners can practise their French.

The idea is disarmingly simple. You have won a five-day trip to the seaside town of Granville in Normandy and can visit restaurants, museums, shops and other places of interest. You may ask for souvenirs and provisions in the relevant shops, select activities and modes of transport and answer quiz-type questions. There is a useful diary print-out routine which produces hard copy of the details of your travels and thus a never-ending source of material for conversation groups. The aim is to start you talking and thinking about your holiday in French.

The dreaded error message 'No room' has been known to come up during run-time, ruining an otherwise marvellous excursion and corrupting the diary file in the process. The program is written in some 20 Basic files which are constantly loading into each other, so that the disc drive never stops whirring, and one variable too many will apparently cause an overload. (This may occur even on the 64k BBC+, as *Granville* does not automatically select Shadow modes or contain the appropriate error-trapping procedures.) One must hope that this will be rectified in later editions. It is a pity that a first-rate program should be vitiated by a thoroughly familiar technical problem.

Osman Durrani

REVIEWS

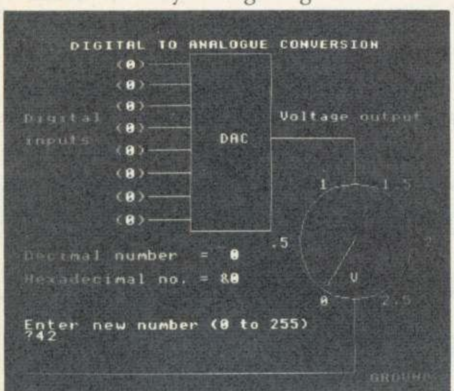
SOFTWARE

MAKING CONNECTIONS

Geoff Bains experiments with electronic circuits on screen

A major problem with the teaching of electronics is that practicals tend to become bogged down in the complexities of interconnecting components rather than with the real business of what is going on. Transistors are fiddly to connect up in the complexity that is needed to do anything useful and integrated circuits confuse pupils with their layout of inputs and outputs – they're so different from the easily remembered block diagram found in the text books.

There are ways of getting around this problem. Griffin and George's *Digital Units* put the uninviting components away inside little boxes which connect together in the same way as a block diagram. However, there still remains the problem of expense and time spent setting up a complicated piece of apparatus to demonstrate a simple point.

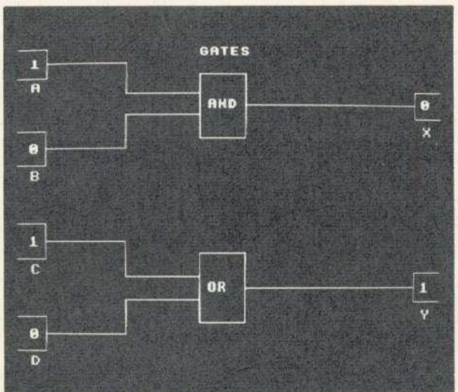


Enter your digits . . watch the voltmeter

Addison-Wesley's *Digital Electronics* course aims to teach electronics without any of these problems by using computer-simulated experiments on the micro.

The course is aimed at secondary school level and at ITECs and further education colleges. It is very much biased towards modern electronics and computers and is in three units – Coding Information, Digital Systems and Microprocessor Systems. Each unit comprises a student's booklet and 40-track disc containing the experiment simulations. The first unit costs £14.95, the other two £19.95, and a complete pack of all three £49.95 (all excluding VAT). All three units are eligible for DTI support.

The unit looked at here is the first of the course – Coding Information. This is designed to introduce students to the idea of digital data and the fact that computers are just a means of processing on-off binary signals.



A classic benchtop circuit on the micro

The unit booklet is about 20 pages long and both teaches and tests students. It is split into six sections which cover the nature of digital data, digital representation of analogue information, logic gates, digital arithmetic, computer (ie, ASCII) codes, and simple computer control language.

Each section is riddled with simple questions to test that what has just been taught has really sunk in. The answers to the questions are given at the back of the booklet – perhaps a dubious advantage.

Dotted around the booklet are four computer-simulated experiments/demonstrations, which strikes me as too few. It is all very well restricting practical time to the minimum when half that time is 'wasted' on setting up and connecting together the apparatus, but when the whole point of the course is to restore some sense to experiments by undertaking them on the computer screen, it is surely more sensible to make the most of it and capture the students' imagination and interest with as many experiments as is reasonably possible. To include fewer than one per section seems to me ludicrously unambitious.

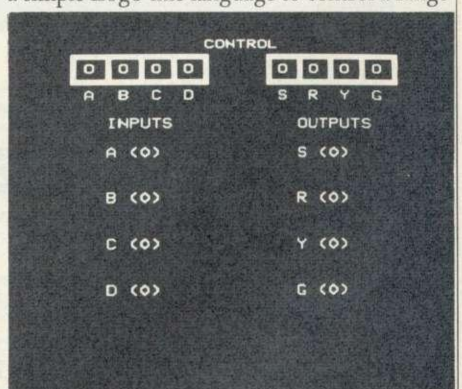
However, four experiments it is. The good news is that the programs are compatible with just about anything (Basic 1 and 2, and B+ and Master) although the last experiment has problems with active shadow RAM or second processor. The whole disc is unprotected, so allowing a backup or tape copy to be made.

The first experiment is one which would normally be a mind-boggling hassle to arrange 'for real' but on the micro is quick and easy. This is a demonstration of digital to analogue conversion. The screen shows a block diagram circuit of DAC connected to a voltmeter. Numbers can be entered into the DAC and their effect on the meter watched. It's simple but effective.

Similarly the second experiment is a classic 'real' benchtop circuit transferred to the microcomputer. This demonstrates the AND and OR gate, using four keys on the Beeb's keyboard to supply the two input states to each gate. The result is then displayed on the block circuit diagram on the screen.

The third program demonstrates simple eight-bit addition, subtraction, and arithmetic shifting on a byte. Doing a demonstration such as this with real hardware would be bound to become far too involved with the circuit which makes it all possible, rather than concentrating on the result.

The fourth experiment is one which would be far too complex for construction in the laboratory, anyway. This program implements a simple Logo-like language to control a range of inputs and output on the screen. The language is simple, with only about 10 commands, but the ability to define new words makes it both fascinating and instructive.



Eight-bit arithmetic made simple

It would be foolish to pretend that computer simulations can totally replace real-life experiments in any subject. However, the *Digital Electronics* course does demonstrate what can be done. It is only a pity that more experiments were not included.

Digital Electronics: Unit 1, £14.95; Units 2 and 3, £19.95 each; complete pack, £49.95 (all exc VAT)
Addison-Wesley, Finchampstead Road, Wokingham, Berks RG11 2NZ. Tel: (0734) 794000

SOFTWARE

MICRO MELODY MAKER

Jeffery Pike gets dots before the eyes with a new music package

There are numerous music packages around, on ROM, disc and tape, all designed to make the most of the Beeb's sophisticated four-channel sound facility. They all have their good points and their shortcomings. Some make inefficient use of memory and can only handle short tunes; others are cumbersome and difficult to operate; others demand either a well-developed musical imagination or a high degree of programming skill.

Writing tunes

It must be said straight away that *Musicpen* is of little use to anyone unfamiliar with reading and writing conventional music. If you can't read the dots, you won't know the score (geddit?). Entering the music editor from the menu, you first select a key signature (from a choice of nine – why not all 12?) and a time signature (2/4, 3/4, 4/4 or 6/8 – not comprehensive but adequate for most uses). It isn't possible to alter these within a piece of *Musicpen* music, so if you start in waltz time in the key of F, you're stuck with it throughout.

Then you're presented with a display of treble and bass staves waiting for your masterpiece to be written on to them (figure 1). Notes and rests are easily entered by a combination of function keys, cursor keys and the space bar, and appear on the staves as orthodox notes – well, nearly orthodox, for the note stems often stick up when they'd normally go down, and quavers and semiquavers are not joined by their tails where you'd expect them to be. A nice feature is the way that, as you enter notes, rests appear towards the end of each bar (barlines are drawn automatically), to let you know what note values are needed to fill it exactly. You can jump easily from one voice (channel) to another, so you can write one line at a time or fill in your counterpoint or harmony as you go along. The second or third voices dutifully appear at the right vertical position in the bar.

Musicpen is unique in its ability to accept data from a light pen. I have to confess that I don't own a light pen, so I was unable to try entering music by this means. But I tried the joystick option – and it didn't work. After configuring my joystick as instructed, I found I could jump forwards from bar to bar, but couldn't enter notes or move backwards. Let's hope that this is just a teething problem in the prototype. In any case, keyboard entry is very straightforward when you get used to it.

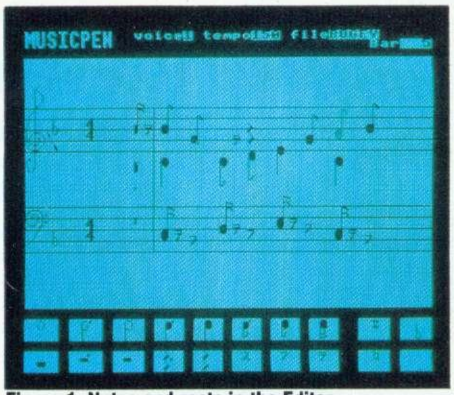


Figure 1. Notes and rests in the Editor

Editing

When it comes to editing music, you can't jump to any point in the tune, only forwards or back to the adjacent note or the adjacent bar, or to the very beginning, or the very end. To make matters worse, auto-repeat is disabled for the cursor keys, so it can be a laborious process stepping bar-by-bar through a long piece. But once you get there, it's simple to alter the pitch or length of a note, or to delete it completely. And those useful rests pop up automatically to make everything 'fit'.

When you're entering or editing music, it's vital to be able to hear bits of it as you go along. The playback facility of *Musicpen*, like everything else about it, has its good and bad features. You don't need to start from the beginning: you can play back from wherever you left the cursor. You don't need to hear all channels at once: you can select any one, two or all three to listen to. On the minus side, you can't transpose the music up or down once it's written (as you can with some music software). More seriously, there's a very limited choice of tempo – only six options, ranging from not quite slow enough to not quite fast enough.

Envelope editor

Musicpen doesn't provide a set of predefined envelopes as some music programs do. You start with an even, characterless sine wave on all three channels, then use the envelope editor to create your own sounds. That's when the fun really starts. If you've had problems in the past unravelling the *User Guide*'s explanation of the Beeb's 14 envelope parameters . . . this won't help much.

You enter the envelope editor (quaintly called 'synthesizer') from the menu, to be confronted with a display that's trying to look like a graphic equaliser. The 13 sliders represent the parameters of the envelope command (without the first one, the envelope number) – but it's fiendishly difficult to relate them because they're displayed in a different order, with different names. If you've spent hours trying to memorise the parameters, it's distressing to find them laid out in a new sequence. It would help if the sliders at least had the same names – ALA, ALD, etc, instead of ATK TARGET, DCY TARGET, etc.

Once you've figured out which is which, it's easy to adjust each one with the cursor keys to form a new envelope. There's a play facility so you can hear how it sounds and a useful 'demo' feature which plays the sound repeatedly while you juggle the parameters.

But when you've constructed some mellifluous new envelopes, it's frustrating to discover that you're limited to a maximum of three, one for each channel. You simply can't edit a new one without losing (or saving) one of the three. It follows that your music can't draw on a library of envelopes, or change tone as it plays.

Incidentally, there is the possibility of using a fourth voice throughout, with the Beeb's notorious noise channel. But *Musicpen* is no more successful than anyone else has ever been at incorporating its limited range of squelches and hisses into euphonious music.

Other functions

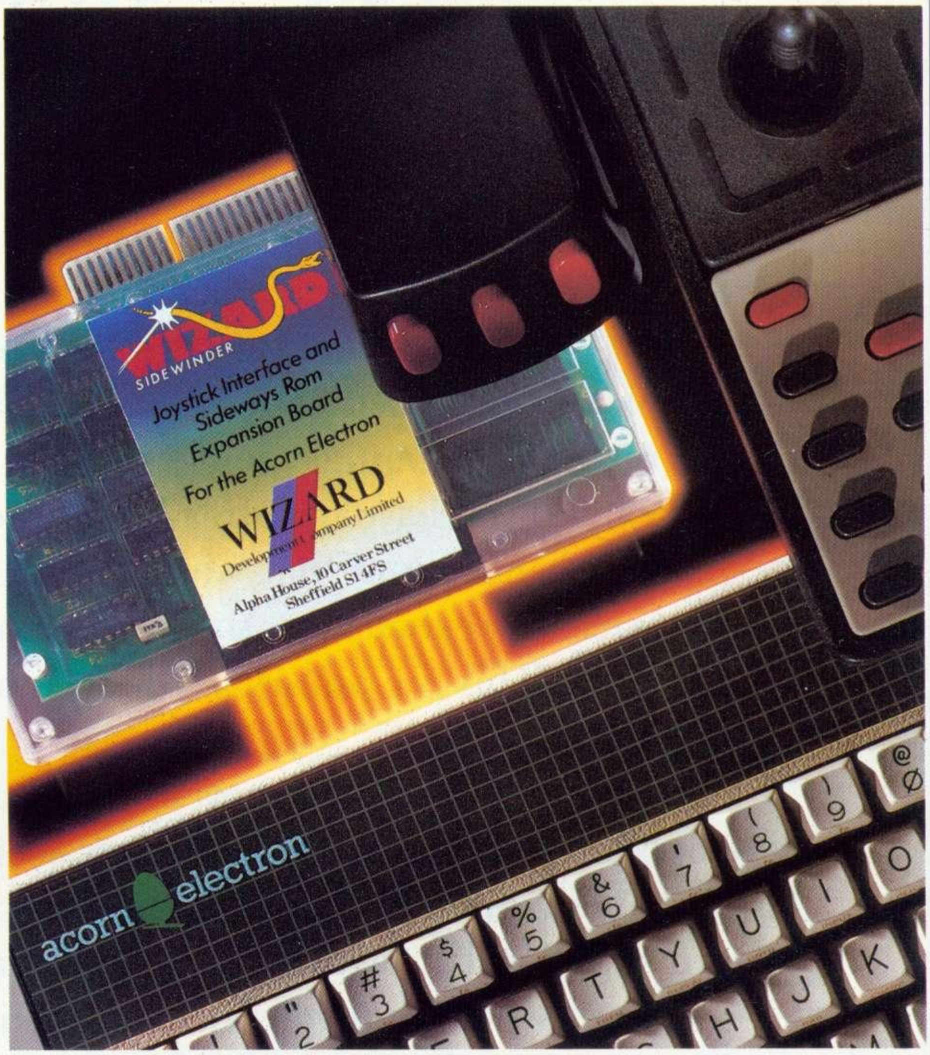
A piece of music can be easily printed out on an Epson-compatible printer, and both tunes and envelopes can be saved and loaded from disc or tape. The 60-page manual goes into considerable detail on saving and loading files, stating all the obvious things that we should all know anyway. In fact, Sahlan Diver, the author of the software and the manual, seems to assume throughout that the user will have a fair degree of musical knowledge but a limited amount of computer experience. If that describes you, this could be the music-making software for you.

Musicpen, £28.75 (16kROM), by mail order from CNC, 41 Cheney Way, Chesterton, Cambridge CB4 1UE. Tel: (0223) 322244.

HARDWARE

JOY FOR ELECTRON USERS

Mike Jackson reviews a new joystick interface and ROM board



PHOTOGRAPH BY MARK TURNER

Sidewinder is a semi-transparent box, 16cm by 9cm, providing Electron users with a unique combination of three facilities: it is an interface for a nine-pin switched joystick; it holds software in ROM which allows you to convert games to respond to the joystick; and finally (and quite differently), it is a ROM board with three spare sockets for your own firmware.

The unit fits directly on to the edge connector on the Electron. If you have a Plus 1 or 3, it must be detached and reconnected on to the far edge of the unit, which is claimed to be a full through bus connection. In this way, the Sidewinder will bridge the computer and the Plus interfaces. I could not test it with the Plus 3, but with the Plus 1 attached the system not only seemed ungainly, but was also insecure: it could quite easily be separated by a knock, even while powered-up. Otherwise, the Plus 1 seemed to work normally. I fitted a Spectravideo Quickshot II joystick to the Sidewinder and it seemed to work well.

The instructions for setting up are easy to follow. Simply type *JS ON and then reply to the short sequence of prompts – these tell the unit which keys are being used by your game for direction and fire. You are then told to load your game. Although in ROM, the software uses some RAM and a very long game may fail to run, with the equivalent of an 'out of room' message: *Repton 2* bit the dust here (I know, who needs joysticks for *Repton 2*?).

Wizard claim 99 per cent compatibility with Electron software. They claim to have tested the Sidewinder on software from a number of the leading software houses – I, though, only have a very limited selection. Well, the good news is that *Strike Force Harrier* is finally brought to heel. At last I could use my Quickshot II to fly with unequalled ecstasy into the side of every mountain on the map. It made it a different game and *Harrier* freaks may find it the answer to their dreams.

But will it liberate Electron *Elite* players from the keyboard, and enable them to blast their way beyond 'Rubbish' status? The answer, sadly, is no: the game loads and runs and you can still use the keys as normal, but it does not respond to the joystick.

Wizard believe that this may be due to lack of memory but are hoping to get their programmer working on an answer. So you're stuck with the old problem of not always knowing if the unit will work with your favourite games. If you want it to work with any particular software you should check first.

You can see the three spare ROM sockets (next to the *Joy* ROM) through the plastic cover. The cover is easy to remove and you can insert programmed ROMs of size 2764 into any of the spare sockets and also apparently into the *Joy* ROM's own slot. I used Beebugsoft's *Toolkit* ROM and it seemed to work without any trouble. Although not claimed in their advertisements, Wizard have told me that a small adjustment to the Sidewinder will allow it to be used for sideways RAM: anyone interested should contact Wizard for confirmation and details.

With the Plus 1 attached I was able to alternate between the *View* cartridge and the *Toolkit* and *Joy* ROM: one of the advantages of a ROM board is that you can easily switch between ROMs. For example, it was very useful to have these last two ROMs 'on call' at the same time when I was writing a joystick routine for the Sidewinder.

Those interested mainly in using ROMs will judge Sidewinder according to the system they want and can afford. I would think that this unit's main strength will depend on its ability to convert current popular software to work with a switched joystick. Nevertheless, this is an interesting combination and may make a useful addition to the choices available for expansion. Now, where are those mountains . . ?

Sidewinder, £39.95

Wizard Peripherals, 29 Glenalmond Road, Banner Cross, Sheffield S11 7GW. Tel: (0742) 683435.

REVIEWS

SOFTWARE

PRIVATE INVESTIGATOR

Powerful software to edit discs in depth, reviewed by Geoff Bains

Advanced Computer Products has produced some remarkable software recently and the latest is the *Advanced Disc Investigator* (ADI). This ROM-based package costs £28.75 and is worth every penny to the serious disc user.

The *ADI* is a language ROM providing a very flexible disc editor. It can deal happily with a standard BBC micro with an 8271 disc controller chip, and a B+, Master or Electron with Plus 3 with a 1770 chip.

The ROM is called with *ADI which displays the *Advanced Disc Investigator* command screen. Displaying a rare sense of humour, ACP has designed this screen to look like a disc inside its sleeve. On the 'label' of the disc is the command menu, on the 'sleeve' a window shows the status of the package and the bulk of the screen displays the output.

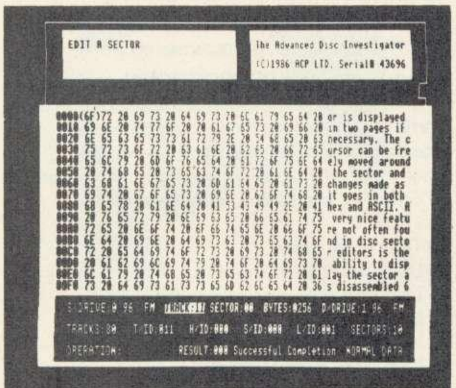
The *ADI* offers you 17 commands to manipulate your discs. The commands are selectable either by moving the cursor along the single letter mnemonics displayed and selecting the required letter with the Return key, or by typing in the initial letter of the command itself. The choice of methods provides a very easy way to enter commands that will satisfy any tastes.

Status display

The status window not only displays the current status of the program but also allows you to change it. Various parameters are displayed, including the drive number, the number of tracks, and density of the source and destination drives, the first track and number of tracks to be operated on by the command selected, and the first sector and number of sectors to be used by the command. Other current parameters include: track information such as length in bytes and track, head, sector, and length IDs, the current operation being carried out by the floppy disc controller chip, and the result of the last operation.

These parameters can be altered using the cursor keys in conjunction with the Shift key. The parameter to alter is selected with the horizontal cursor keys and Shift, and its value increased or decreased with the vertical cursor keys and Shift.

For some unknown reason ACP has elected to use the up key to decrease a value and the down key to increase it! Crazy, but at least



***ADI* displays several useful parameters**

values can be entered directly from the keyboard as well.

The first and most useful command will Copy the contents of one disc onto another. This is not a normal backup command but a complete disc copier that will copy strangely formatted tracks across as they are recorded, and generally worm its way past most protection. It is a simple matter to alter the relevant drive sections of the status window to, say, copy a protected 40 track disc onto another for use in 80 track drives.

The *ADI*'s Verify command does not check a disc for valid data as DFS verify commands do. Instead, it checks the contents of one disc against another to see that all has gone well during the copy operation.

The third command is to Edit a disc sector, and is very similar in operation to most disc sector editors. The sector is displayed with both hex dump and ASCII field. However, as the *Advanced Disc Investigator* can deal with all discs created using the 8271 and 1770 controller chips, it must cope with sectors which are considerably longer than the Beeb's standard 256 bytes of data, so the sector is displayed in two pages if necessary. The cursor can be freely moved around the sector and changes made in both hex and ASCII as it goes. A very nice feature is the ability to display the sector as disassembled 6502 codes.

If the detailed workings of strangely formatted discs concerns you then the Scan command will be useful. This reports on the track, head, sector, and length ID codes from each sector of the disc and the sector's length in bytes.

The *Advanced Disc Investigator* is also capable of formatting a disc to any strange format which it can read. The Format command will format any number of tracks to any specification the controller chip can handle according to the information in the status window.

The skew and field gap sizes can also be changed with the Modify command. These affect the most basic workings of the controller chip and being able to control the formatting in this way means that just about any format of disc can be created. If you have a 1770 controller chip you can easily use the *ADI* to, say, create discs readable by an IBM PC.

Even more amazing is the Unformat command. Although this will not literally restore sections of a disc to their new condition, it formats them in such a way that the disc controller cannot recognise them as formatted.

ROM routines

Several of the rest of the commands available in the *Advanced Disc Investigator* are really routines used by the ROM itself. These allow you to read in sectors from the source disc to a RAM buffer, edit them in a similar way to the disc sector editor, and write them out again to the destination disc.

The final *Advanced Disc Investigator* commands turn the printer on and off for a permanent record of the disc contents, restore the status parameters to their default values, and allow *commands and OSWORD 7F calls for the floppy disc controller chip to be issued.

The *Advanced Disc Investigator* is without a doubt a powerful piece of silicon. Its operations comprehensively cover just about anything you might want to do with a floppy disc – backing-up, repairing corrupted tracks, creating protected discs, not to mention just editing a wider range of discs than other editors can manage. The manual introduces each command in a clear and concise manner and gives a brief description of all the various ID codes and parameters that go to make up a disc sector. However, very little is actually said about how to use these either to overcome or to instigate protection on a disc. This is a shame as it can only put off newcomers to this field trying this otherwise excellent product.

Advanced Disc Investigator, £28.75 (ROM)

Advanced Computer Products, 6 AVA House, High Street, Chobham, Surrey GU2A 8LZ. Tel: (0276) 76545.

NEW BBC PRODUCTS FROM CLARES

FONTWISE PLUS £20.00

40 80 3" 0

Due to the phenomenal success of FONTWISE we just had to make FONTWISE PLUS compatible with VIEW as well as WORDWISE and WORDWISE+, at your insistence!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

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Enhanced BETA-BASE £25

40 80 3" 0

SPECIFICATION

1) Random Access	- disc based, single or dual drives
2) File Size	- max 65,000 records
3) Record Size	- up to 2048 characters and 200 fields
4) Field Size	- up to 254 characters
5) Holds	- approx 1200 ADDRESS records per 100k
6) Search	- 5 search fields using powerful options
7) Sort	- 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

*CALCULATE - using any valid expression
*PRINTOUT - Powerful options
*REDEFINE - Titles, fields etc.
*TRANSFER - From one file to another
*GLOBAL ENTRY - of repetitive data
*SEARCH LISTS - Allow creation of sub Databases within main Database
*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure

BETA-BASE UTILITIES £12.00

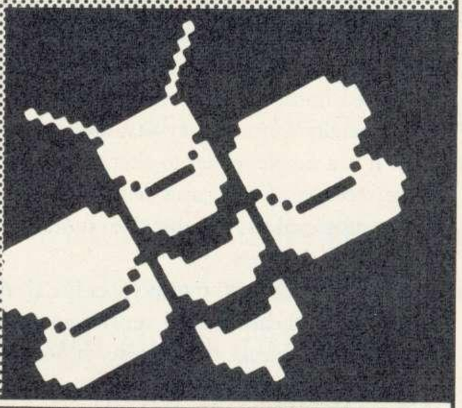
40 80 3" 0

Extend the power of Beta-Base with the extra facilities provided on this disc.

*MAIL MERGE
*LABEL PRINTER
*DISC SORT
*EXTENDED SEARCH
*FREE FORMAT TRANSFER
*FAST PACK
*STATUS

The MAIL MERGE alone is worth £12 so you get a real bargain with this disc. The features are so numerous that we cannot mention them all here.

Ask for our UTILITIES DATA SHEET if you want more information.



BROM PLUS £34.50 — £30 DISC

40 80 3" 0

BROM was yet another of our runaway successes and such has been the demand for extra features that we have now produced BROM PLUS. Most of the original BROM favourites are there plus a whole host of additional commands to aid you, the user.

Commands include:

- EDIT - a FULL SCREEN EDITOR, not to be confused with the line editor used in other toolkit ROMs
- ERROR ON traps errors and enters the EDITOR
- FIND all occurence of a string or keyword and enter the editor, TAB will find the next one and so on
- SCHANGE a search and replace facility
- LCOPY & LMOVE allow you to copy and move lines
- PACK is a very powerful routine which removes REMs & spaces and forms multi statement lines in a very intelligent way
- RENUM is a partial renumber facility
- XREF allows you to cross reference your program
- COMPARE a file against memory
- DEDIT a robust disc sector editor
- DFIND to search a disc for a string
- DGET/DPUT to load or save sectors
- FORM allows you to format up to 4 disc sides
- MENU to load programs from a disc with a BROM menu
- XCOPY to selectively copy files from disc to disc
- XDEL to selectively delete files from a disc
- MEDIT to view and edit memory - FAST
- ROMLIST lists all ROMs and their current status
- ROMON & ROMOFF which enable you to turn on/off sideways ROMs even after CTRL/BREAK.

"This is the best BASIC screen editor I have so far used."

MICRO USER August '85

MACROM £40 £35 DISC

40 80 3" 0

MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
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- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.
Ask for a data sheet today

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40	40 TRACK
80	80 TRACK
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All prices inclusive of VAT & Carriage - NO EXTRAS! Please state 40 or 80 track disc and state D.F.S. you use.

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HARDWARE

ACORN'S SUPERCOMPUTER

Peter Voke witnesses the 32016 Second Processor in action

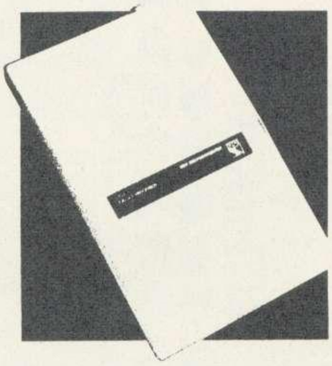
The BBC microcomputer is almost unique in its design as a stand-alone personal or education computer that can also act as a 'front-end' for a different and possibly much more powerful second processor. The concept proved fruitful for Acorn when it brought out the Master series: by putting the 'back-end' processors inside the case, the hybrid BBC micros can serve a variety of markets, with Turbo, Master 512 and SC versions catering for the home enthusiast, small business user and higher education markets respectively.

The Master SC is not out yet, but its precursors, the 32016 Second Processor and the Acorn Cambridge Workstation, have been around for some time. Little is heard of the 32016 processor partly because of the very specialised market it is aimed at; it is designed primarily for use in colleges and universities, and Acorn have only sold a few hundred machines so far. As I hope to explain, the 32016 is a very different proposition from the more familiar 6502 and Z80 second processors.

For one thing, it costs more: 32016s are available with one megabyte (mb) of RAM, costing typically £1400. (The Master SC was originally said to have half a megabyte, though most of the software available needs 1mb.) The Cambridge Workstation is basically a complete 1mb system with separate keyboard and screen included, costing £3480 plus VAT; there is a 4mb version of the Workstation, too. It is immediately apparent that the 32016-based systems are not ordinary 'home' machines. To find out more, there is no better place to go than Queen Mary College in the East End of London, which has no less than 80 of the 300 machines Acorn have sold.

The 32016s at Queen Mary College (QMC) are being used in two quite distinct ways. Sixty-four of the 80 machines are linked up in Econet networks; each network consists of up to 12 processors (each plugged into its own BBC, of course) together with its Winchester hard disc fileserver. The other machines, however, are being used as personal supercomputers by individual members of staff who have number-crunching research projects under way.

The individual academics who have 32016s are all fairly pleased with them. Most are using the 32016 Fortran-77 compiler, which can handle Fortran programs ported straight on to the 32016 from the London University network. I spoke to Dr Andrew Tworkowsi, who was running programs originally developed for the university's Cray-1, one of the fastest supercomputers in the world. Andrew was using the 32016 to pursue his research on chaotic dynamical systems, and getting the same answer using double precision Fortran on the 32016 as he had got from the 64-bit Cray machine. For his programs, running time on the 32016 was about 140 times longer than on the Cray, so programs that had taken half an hour on the supercomputer took three days on the 32016. But since the Cray had to be shared with many other users, a job like that would frequently take up to a week to be run on the supercomputer. Andrew now gets his results faster, using a machine that is more than a thousand times cheaper.



Little is heard of the 32016 processor partly because of the very specialised market it is aimed at; it is designed primarily for colleges and universities

Individual supercomputers like Andrew Tworkowski's 32016 are an immensely attractive proposition, and anyone who wants a desk-top Fortran engine and doesn't need more than 1mb total memory should consider one. You may not always get one-140th of the speed of a Cray-1, but my tests suggest you will never get worse than a 700th, which is still impressive. Andrew's 32016 co-processor and BBC micro have never broken down, and are run from double 80-track floppy drives. Other academics are using them for statistical analysis in biology, or doing long Fourier transforms on data taken directly from instruments.

Of course Fortran is not the only possibility: 32016 Assembler, Pascal, Lisp, Basic and BCPL are all available, plus several packages run within or using these languages, such as the *Gino-F* (for Fortran graphics), *GCAL* (a text processor written in BCPL) and the algebraic manipulation package *Reduce* (in Cambridge Lisp). The languages are all standard (Fortran has the WHILE statement as an optional extension), and generally appear top-notch. If you are keen on Lisp, make sure it is the dialect you want. If BCPL is what you are after, try it first; it is probably the weakest of the languages on the 32016. Prolog is promised, along with more applications packages.

The main complaints are that too many important features had been 'promised' by Acorn for far too long. Sounds familiar enough. Crucially, the 32016 still does not have a good straightforward wordprocessor – you have to use *GCAL*, or make do with *View* on the BBC micro. The popular scientific wordprocessor *Vuwriter* is promised, but the current version is unusably slow according to Acorn. Vuman, the authors of *Vuwriter*, are trying to speed it up.

A rather less rosy story comes from those who are using the networked 32016 processors. David Pick, who as head of Small Systems in the computer unit at QMC has his own 32016 in his office but is also in charge of the software for the networked machines, sums up his mixed experiences by saying: 'When they are good they are very, very good, but when they are bad . . .'

Quite simply, in the months since the 32016 networks were set up, single machines have crashed far too frequently. When use of a network has been high, it is possible for the whole network to crash so that it has to be rebooted from scratch. Of course this can happen on any Econet; but the large files that a network serving 32016s has to transfer seem to make the problem more frequent. Lecturers who are trying to teach Fortran, Pascal or Lisp to groups of first or second year students were

REVIEWS

HARDWARE



Deborah Pollard of QMC had some grim experiences with the early versions of the Panos operating system

PHOTOGRAPH BY STEVE SHIPMAN

keen on the 32016s at first; but their enthusiasm soon cooled as their students started to give up in disgust, put off by the regular unreliability of the networks.

In defence of the 32016 (and Acorn), it should be said that QMC is what the Americans would call a 'beta test site'; in other words a field trial site for many of the systems (hardware and software) that make up the 32016 package. In particular, QMC has been deliberately pushing the Econet networks as far as they will go – and probably a good bit further. It may well be that QMC has seen every problem that can crop up on the 32016, and that they are now nearly ironed out.

Deborah Pollard, who runs the Computer Aided Design and Education Centre at QMC, has had some of the worst experiences with her relatively small network in the Centre. Machines typically crashed three or four times a session with the older versions of the operating system, Panos. Deborah emphasises that things have improved markedly since the field trial version 1.3 of Panos was installed recently, and is expecting that things will run a lot more smoothly next academic year. Loading files and linking compiled code for running are both much faster under Panos 1.3, though someone used to other well-known operating systems will still find such actions as loading or deleting files rather slow.

A number of good computer aided teaching programs had been brought across from the College's ICL mainframe (a straightforward process) and ran without too much alteration. Standard Fortran-77 will usually run first time on the 32016. Programmers used to a mainframe find the 32016 a bit short on facilities such as Fortran debugging diagnostics, the ability to link in libraries from one language to another, a Basic compiler or the means to dump a screen to disc or printer. The 32016 is still limited to some extent by the BBC micro, and is less than ideal for Computer Aided Design; there is no mouse or trackerball software, and the screen resolution is too low. Deborah also commented on the lack of a decent wordprocessor or spreadsheet for the 32016 (*Matrix 3* is 'promised', like *Vuwriter*).

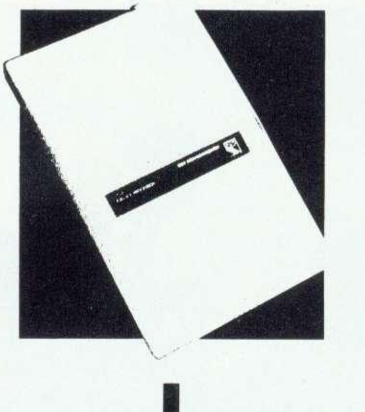
In spite of these complaints, what I saw in the Centre seemed impressive. Most of the work is done in Fortran, and the facilities for creating, compiling and running code seem attractive and easy to use. Regrettably there are still a few bugs in the screen editor (which is otherwise excellent) though most have been eliminated in Panos 1.3.

The Pascal and Lisp have been used by lecturers teaching in the Computer Science Department, but the networks have caused just as many problems in these contexts. A course on algebraic manipulation using the Lisp program *Reduce* could only take place at all because of the facilities provided by the 32016. Unfortunately, the large amount of code required students to interact frequently with the Win-

chester over the network – and the crashes have been correspondingly more severe.

The 32016 is now reaching the point where it may well get – and deserve – more attention. The richer secondary schools or sixth-form colleges might consider a few in a network, if the demand is there for Fortran, Pascal, Lisp and/or C. If you are thinking along these lines, then bear in mind that the software does cost extra, and don't expect to save cash by cutting corners. Even a small network needs a Winchester hard disc, and should be installed on the basis of a one or two month acceptance test. Insist on the latest version of Panos, and if the network doesn't stand up under the most gruelling use your students or sixth-formers can subject it to, throw it back at Acorn and ask for your money back.

This hard-nosed approach is probably the only way to deal with a system that can vary from wonderful to worse than useless: from giving each of your students the power of a small VAX supermini to the sort of unreliability that puts people off programming for life. If you are an individual researcher or freelance software developer, the 32016 is well worth considering. The totally standard Fortran and Pascal mean that programs developed on the 32016 will run on any mainframe. If you wish to get results, remember that a personal 32016 can give you hardcopy output about as fast as a supercomputer shared with a few hundred other users, for less than the cost of a motorbike. If applications packages are what you are after, the 32016 is still rather weak compared, say, with the IBM. With the small installed base, it is hardly surprising that software is a bit thin on the ground. Acorn need to turn the vicious circle of software famine and unreliability leading to low sales into a virtuous circle of new software coming on line to supply a growing community of a few thousand enthusiastic and contented 32016 users. Maybe the Master SC will be the magic wand to perform that trick.



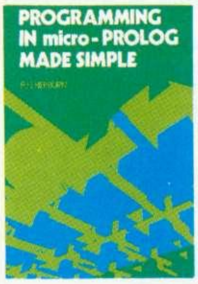
In defence of the 32016 (and Acorn) it should be said that QMC is a field trial site for many of the systems that make up the 32016 package

32016 second processor, £1295, Acorn Computers, Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411

REVIEWS

BOOKS

LOGICAL LANGUAGE



'Programming in Micro-PROLOG Made Simple', P H Hepburn, Ellis Horwood, £8.50

Micro-PROLOG is the language of artificial intelligence, adopted by the Japanese Fifth Generation project and taking over from Lisp in many applications. It's becoming popular in education because the basis of the language is logic rather than maths.

But for people brought up on Basic, languages like this can be hard to grasp. The manual which accompanies the Acornsoft micro-PROLOG software, for example, is practically unreadable for newcomers. That's what this book tries to put right. Most of it is based around five specific applications which serve as examples for the various principles and techniques that are used in Prolog programming.

The book is not machine-specific. Micro-PROLOG version 3.1 (including the Acornsoft product) is almost identical across different machines, and so the programs in this book will run without problem on a Beeb. By the same token, however, the book doesn't properly cover the few machine dedicated primitives, such as file handling and graphics, so you will still need the standard manual.

Throughout the book the syntax used is for the SIMPLE supervisor which is loaded in over Micro-PROLOG. It has the advantage of being friendlier than the core language, but is a little less powerful. There are a few examples of core syntax, but they're not fully explained and someone wanting to tackle that subject would do better buying de Saram's *Programming in Micro-PROLOG*.

This book makes an excellent basis for classroom sessions, and also a good starting point for anyone wanting to make the move from Basic into this fascinating language.

Steve Mansfield

GOOD THEORY, BAD PRACTICE

'Interfacing Your BBC Microcomputer', Roger Morgan/Winston McClean/Joan Rosell, Prentice Hall, £8.95

Yet another BBC Micro hardware projects book, this time with a bias towards laboratory experiments. I suppose this book was aimed at students on technical courses, but this is just my guess, as reading it through left me still uncertain. The level of the material varies almost page by page, from the use of integral calculus to advice on how to wire up a relay. In general the levels of theory and practice are ill matched: the practical side often falls short of adequate support for good theoretical work.

There are good notes on the use of the Tube (quite unusual, this), and the programming examples are clear and well written.

A good book to pick and choose from, but not recommended for the hardware beginner.

Mike Barwise

HARDWARE

TRUE TO TYPE?

Bill Penfold gets his hands on a novel keyboard

In theory typewriter keyboards should be laid out entirely differently. In theory, the whole board should be a different shape – and that's the idea behind the Maltron ergonomic keyboard. Unfortunately it's probably not a viable theory. But before we start knocking the idea it is only fair first to consider what the conventional keyboard is like – and why.

Look at your own Beeb. Apart from the row of red function keys at the top, what you have is an ordinary, everyday English-language qwerty keyboard. (It is called Qwerty because those are the letters at the start of the first row beneath the numbers.)

When this layout was devised typewriters were of the old sit-up-and-beg variety. You bashed a key attached by a wire to a letter arm which then hammered an impression through an ink ribbon.

It wasn't difficult to get letter arms jammed together by rapid striking of two keys consecutively and, to prevent that, the designers decided the best thing to do was to slow down the typist a bit through the layout of the keys. And that is how we got the qwerty layout.

Bill's beef

I've had a long-running bellyache about the standard Beeb keyboard. This is because for touch-typists the BBC micro, despite its many virtues, is a bit too flat and cumbersome, a complaint which may come as a surprise to the majority of home computer users considering the standard of most other micros' keyboards. But for those used to hammering away at an old-fashioned, coal-fired typewriter, the BBC micro keys are a bit close and cramped: it is almost impossible to build up any real speed.

The first thing I did after being handed the Maltron package by a gloating editor was to try to buy a copy of Adam Faith's *What do you want?* The reason will be explained shortly.

Anyway, Maltron's kit for the BBC micro is quite an impressive package . . . at least in theory. First you have to replace your Beeb keyboard with a specially converted one to which the Maltron board can then be attached.

At first sight the Acorn board supplied with the package looks no different from the one already on your micro apart from the peculiar flexible connector trailing from beneath it. Turn it over, though, and you will see the conversion work which is probably most kindly described as 'robust'. The only problem with mine was that the down cursor key did not work, which meant having to use the Return key to travel down the screen.



The unconventional layout of the Maltron

The Maltron board itself is fitted on to a black keyboard case similar in size to the Viglen remote console. Like your own Beeb it has a top row of 10 red function keys. But that is where any similarity ends.

The Break key is to the left of the function keys. The keys themselves are in four groups: two large groups of 27 on the right and 26 on the left. These cover all the characters apart from the 'E' and the full stop which are part of a small group of six keys on the left. The other four keys on the small left-hand group are Delete and CTRL plus two of the cursors. The right-hand small group also has Delete and CTRL keys plus the other two cursors. It also has a small single key for spacing instead of a space bar and a small key for Return. The idea is that the typist's hands can flick from key to key more quickly and with less stretching than on a conventional board.

With the package comes an introductory booklet promising 'greater results with less strain' and 'a new level of keyboard comfort and accuracy'. Also according to the booklet the 'new ergonomic shape minimises likelihood of physical harm to operators which can be caused by the old design.' Physical harm! I know people are worried about VDUs but will keyboards soon have to carry government health warnings as well? So it would seem. The alleged risks of typing on your common-or-garden keyboard are revealed at the back of the introduction with the reproduction of an article from a New Zealand magazine describing the health hazards of Repetition Strain Injury (RSI) suffered by a typist using a word-processor. Pretty grisly reading – and I've put in for my danger money over this review.

The package also comes with a set of four cassette tapes. But don't try to load them on to your computer – they are instructions, not software. Finally there was a training manual of exercises – exercises which took me back about a quarter of a century and on to the search for Adam Faith's Sixties' hit.

Learning again

Trainee typists, while learning where each key is, bash away for hours at groups of letters designed to implant the keys' location to memory to the point that the typists' fingers go there automatically without thinking or looking. So too with the Maltron keyboard. It was a nostalgic reminder of days learning to touch-type, a would-be journalist among a classroom of would-be secretaries. Anyway, our instructress was a greater believer in the Rhythm Method for teaching you to type. We learned to tap away in time to Mr Faith. What do you want if you don't want money . . . Tap . . tap . . tap . . tap . . . What do you want if you don't want gold . . . tap . . tap . . tap.

Inexplicably there wasn't a copy to be had anywhere in the High Street, just a blank look from the girl behind the record counter – 'Adam who?' To which I could only reply: 'Oh ye of little Faith!'

Still, despite this lack of essential training material, I finally completed my field trial, and my conclusion is that it's a nice idea – but one whose time has not come. And I doubt if it will. Risking the possibility that in another quarter of a century young trainee typists on their Maltron board will be shown these words to mock, I simply don't believe it will replace the qwerty board. It may be better. It may well be faster. But qwerty is too well established to be dislodged. Typists will continue to be trained on qwerty boards because that is what offices use – and offices will continue to buy qwerty boards because that's what millions of typists are trained to use.

Well, that's my theory . . . only time will show what happens in practice.

Maltron Keyboard £175.
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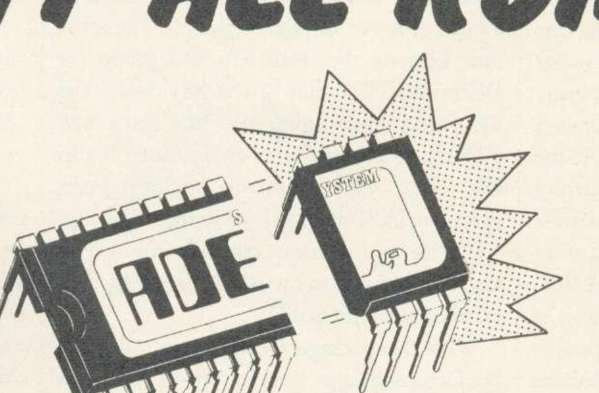
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SYSTEM

REVIEWS

HARDWARE/SOFTWARE

MASTER MEETS IBM – OR DOES IT?

Acorn's 512 co-processor claims to be reasonably IBM-compatible. But Bruce Smith finds that not all IBM software is happy on the Master

The Master 512 computer is the fourth of five Master series computers announced by Acorn in February this year. The 512 is in fact a co-processor board which plugs internally into any Master series machine. It comes bundled with GEM and the DOS Plus operating system, and professes to be reasonably IBM-compatible. Theoretically it should allow access to a phenomenal range of IBM-format software and, perhaps more importantly, allow users of this software to port it from one machine to another with no fuss.

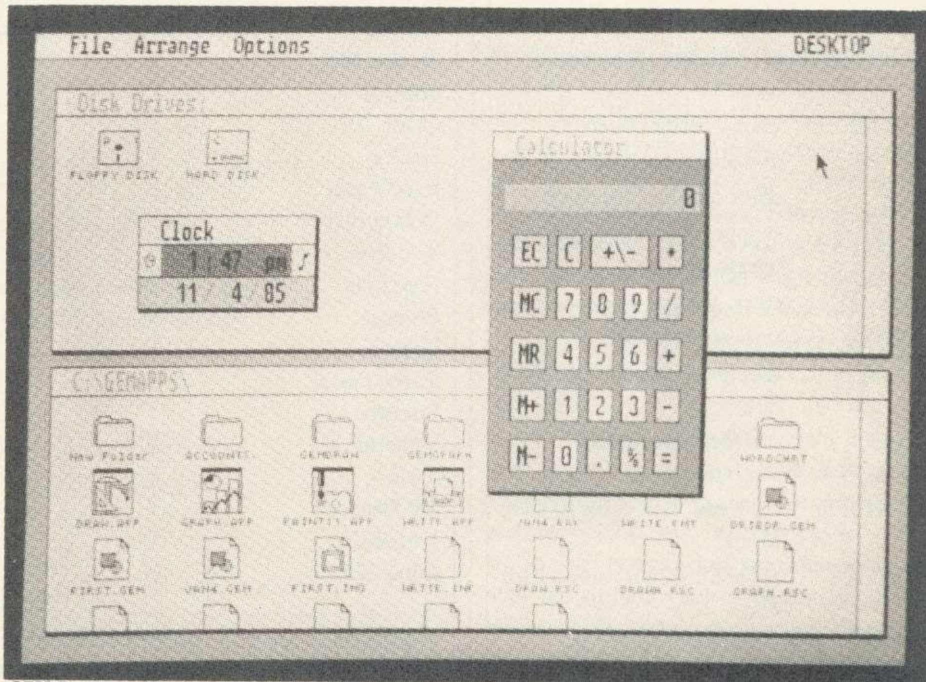
The 512 board is very simple to install and Acorn must take credit for the overall design. Its small size belies the 512k of onboard RAM – don't get too excited though, as this is needed by the software. The co-processor is an 80186 chip which dominates the centre of the board. Once installed the system is brought to life by using a *CONFIGURE TUBE command. This hands control to the 80186 and the 4k Tube ROM then boots DOS Plus from a disc in drive 0.

DOS Plus

The Disc Operating System (DOS) Plus has been specially adapted for the Master by its authors, Digital Research. According to the manual it will 'support both IBM PC-DOS applications and CP/M applications', and is call compatible with CP/M-86, IBM PC-DOS 2.1 and MS-DOS 2.1. This effectively means that any program which conforms to these standards, ie, uses only the official system calls of either CP/M86 or DOS 2.1, will work on the Master 512.

For the uninitiated, a Disc Operating System is the basic level of operation of any computer of this kind. It supports a variety of commands which allow access to discs and include copying and deleting of files. The structure of the DOS is a hierarchical one and thus directories and sub-directories are supported. All files saved are datestamped using the Master's real time clock.

The most fundamental feature of any DOS is that it allows you to load application packages such as wordprocessors and databases which become your working environment. Meanwhile, the DOS stays at the lowest machine level, carrying out your filekeeping needs. Table 2 lists the DOS Plus commands. Lovers of CP/M will notice many similarities, particularly with commands such as ED and PIP. DOS Plus supports a Z80 emulation mode which puts you in a standard CP/M 2.2 environment with all the nominal commands available. Complete compatibility, though, cannot be guaranteed – many of the Acorn Z80 programs make use of the Z80 ROM, so these will not work. Similarly, specialist system programs such as STAT get confused. However the manual assures us that most CP/M 2.2 programs will run, though I did not have time to put this to the test. One final point here is that the Z80 emulator is one of several aspects of the bundled software that, to quote the manual, '. . . is unsupported by Acorn', a subject I will say more about later.



***GEM Desktop*: disc-based filing and administration system**

IBM KEYBOARD	EQUIVALENT IN MASTER NUMERIC KEYBOARD
Alt	Copy
Home	7
End	1
PgUp	9
PgDn	3
Ins	0
Del	Delete
Runbout	Delete (next to Copy)
Num Lock	/
PrtSc	*
Scroll Lock	#
Break	#
Up Arrow	8
Down Arrow	2
Left Arrow	4
Right Arrow	6

Table 1. IBM-Master 512 keyboard emulation

Being able to run and understand IBM software means that the Master keyboard must also be capable of generating IBM keyboard codes. The 512 keyboard driver is designed to return the same values as the IBM PC. Many of the keys on the numeric keypad are used for this purpose – for example, the 7 key is the equivalent of the IBM Home key (see table 1). However, with the software I ran, pressing the required key combinations didn't always work, so obviously there are still problems.

Loading applications in DOS Plus is not always as fast as it should be – this is because it may have to recognise the format of a disc. The

A:	select drive A
B:	select drive B
ALARM	real time clock/alarm
BYE	park hard disc read/write head
CLS	clear screen
CHDISK	check integrity of DOS Plus disc
COLOUR	change screen colours
COPY	copies a file, renaming it if required
COPY CON:	copy file from keyboard to disc
CHDIR	change current directory
DATE	display/change date
DIR	select specified directory
DISK	supplies menu-driven disc operations
ED	enters the text editor
ERASE	erases specified file
ERAQ	selective erasure of files from disc
FSET	sets file/drive related attributes
GETFILE	copy BBC ADFS file to DOS format
HDISK	as for DISK but using a hard disc
MEMDISK	create fast memory disc
MKDIR	create or make a new directory
NETPRINT	print files on BBC Econet print server
NOTUBE	leave DOS Plus and return to Master environment
PATH	set path route
PCSCREEN	select IBM screen emulation mode
PIP	advanced file copying facility
PRINT	print files as background task
PROMPT	change prompt
PUTFILE	copy DOS Plus format file to BBC ADFS format
RENAME	rename specified file
RMDIR	remove subdirectory
SDIR	display file status information
SET	display/change DOS Plus environment (ie, screen length, number of lines, etc)
STAR	pass command to MOS
TIME	display/change time
TREE	display all subdirectories on specified disc
TYPE	types file to screen

Table 2. DOS Plus commands

main format used is the Acorn 800k format – a few seconds may be added to the loading time if, say, a 360k IBM OC format disc is used. This can be got round by copying the software to an Acorn format disc.

Other problems may also occur, for instance, when using IBM PC 360k discs where the format is 40 tracks. When data is subsequently written to the disc on 80 track drives the result may not always be capable of being read back into the IBM with the 40 track drives. This is because the read/write head mechanism on a 40 track drive is twice the width of the head in an 80 track drive and may have difficulties in reading the data.

Although the Master 512 is supplied with 512k of memory, DOS Plus takes a large bite into this – 154k to be exact. PC DOS 2.1 uses just 64k when running on an IBM PC, hence the usable space on a Master 512 is 90k less than the usable space on a 512k IBM PC. IBM PC packages that require either 256k or 348k memory space will run on the Master 512, but packages requiring more memory will probably encounter problems. Certainly those packages 640k in length will not run.

Software	Compatibility	Comments
TurboCAD	Y	
dBase II	Y	
Quest	Y	
Speller	Y	
Exec Writer	Y	
Volkswriter 3	Y	
Wordstar	Y	
Exec Filer	Y	
Promise	Y	
Draw it	Y	
Turbo Pascal	Y	
Logistix	Y	
Supercalc 3	Y	
Twin	Y	
VP Planner	Y	
Lattice C	Y	
Lotus 123	N	Copy protection mechanism tries to access IBM PC disc controller
Symphony	N	Copy protection mechanism tries to access IBM PC disc controller
dBase III	N	Copy protection mechanism tries to access IBM PC disc controller
RBase	N	Use of undocumented system calls
SDS-XP (MOdula 2)	N	Package requires > 20 files open
VuWriter	N	Needs hardware dependent dongle

Table 3. Software tested by Acorn on the 512

GEM

The Graphics Environment Manager (GEM) is supplied on two discs and contains three applications: *GEM Desktop, GEM Write, GEM Paint.*

Briefly, *GEM Desktop* is a filing and administration system; *GEM Write* is a wordprocessor; and *GEM Paint* is a graphics program. GEM is a popular WIMP system – Windows, Icons, Mouse and Pulldown menus. You enter the application simply by typing GEM from DOS Plus, ensuring that the correct discs are installed in the drives. You first go into *GEM Desktop* from which you can perform housekeeping tasks or select the other two applications, which is done with the aid of a mouse. The mouse to be supplied with the release version will be a Far East import and have just two buttons. I have seen one of these mice at Acorn and can vouch for its good feel.

Much has been written about GEM in the popular computing press, so I don't intend to waffle on about it here other than to make a few observations for those of you who may not have come across it before.

GEM Write is an adequate wordprocessor, but it's not exactly easy or quick to use (my requirements for a wordprocessor). Mundane tasks such as inserting a line require the positioning of the cursor and the use of the mouse to pull down the correct menu to then select the item marked 'insert line'!

GEM Paint is a graphics package which on a

normal IBM machine will allow you to work in 16 colours. The limitation to two colours on the Master 512 is obviously a serious drawback, though reasonable results can still be obtained using the colours which appear as shades of grey.

Use of the Acorn colour driver (see below) can provide *GEM Paint* with four colours, but this produces worse results and the monotone mode is preferable.

Concurrent DOS

Although not supplied with the 512, Acorn will be offering the impressive Concurrent DOS for the Master 512. This is a version of DOS which allows up to four tasks to be running at the same time. For example, you could be using a wordprocessor such as *Wordstar* while another application was reading and writing to disc, at the same time as printing out a large document! The cost of Concurrent DOS is likely to be high when compared with standard BBC micro software: Digital Research's list price is close to £250 and Acorn is hoping to offer it for under £200. It should be available later this year.

Title	Compatibility	Comments
Wordstar	Yes	
dBase II	Yes	
PCwrite	Yes	
PCtime	Yes	interrupt driven clock
NewWord3	No	files = 20 error
Homebase	No	will not recognise Alt/Shift
Sidekick	No	will not boot
PCfile	No	specialist public domain software
PCtalk	No	specialist public domain software
PCpaintbrush	No	
PC DOS	No	
Autodex	No	
Disclook	No	loads OK – hardware dependent
Discdump	No	loads OK – hardware dependent
IBM PC Games	No	hardware dependent

Table 4. IBM software tested by Smith and Williams

DOS Plus is designed to be compatible with IBM DOS 2.1 (this also includes MS DOS 2.1) Compatibility is achieved at three levels which are: the user commands; the operating system calls; and the ROM BIOS(ROS) function calls.

A number of DOS 2.1 compatible utilities are provided which give the user a similar command interface to that found on DOS 2.1. DOS Plus is system call compatible with DOS 2.1 and all documented DOS 2.1 system calls are supported.

DOS Plus also provides emulation of the IBM ROM BIOS functions. These so-called ROS functions are essential to support application programs that have been written specifically for the IBM PC or PC/XT. The ROS entry points are used by some applications for low level control of various pieces of IBM hardware, examples being: the reading and writing of screen memory; changing screen modes (note that this refers to the modes as found on an IBM video controller card, not modes 0 to 7 of a Master 128); reading and writing sectors on a disc; and scanning the keyboard.

Table 5. The requirements for IBM compatibility

Miscellaneous

The fourth and final disc in the bundle contains a variety of utilities, which includes the colour display driver. For normal operations the 512 operates in a high resolution, two colour mode (black and white by default). A colour driver can be installed which will enable GEM to run in a four colour, lower resolution mode. Like the Z80 emulator, the colour driver is not supported by Acorn and so must be considered a waste of time. I must admit my extreme disappointment at reading such comments in the manual. If a company is supplying software, it *must* support it otherwise it's useless to the user – even if it is thrown in for free.

Software compatibility

The 512 will sink or swim on just how much IBM software it will run. Acorn is currently testing packages and trying to adapt them where possible. Incompatibility in many instances is likely to be caused by protection and direct use of IBM hardware. For example, version 1 of *Lotus 123* will work with a small Acorn screen driver patch, but later versions simply will not run because the protection mechanism tries to access the IBM PC disc controller chip. It is debatable whether publishers of such software will be willing to port the software for the 512: unless the 512 is a best seller the companies would undoubtedly wish to be commissioned by Acorn (at no small cost) to perform the task. Acorn is unlikely in the present climate to initiate such a commission, relying instead on third parties to act on their own initiative. It therefore looks as though the big three products (*Lotus 123, Symphony* and *dBase III*) will not see the light of day as far as the Master 512 is concerned.

Table 3 shows the software tested by Acorn and this is quite encouraging. Table 4 shows the IBM software I tested with the help of Simon Williams. This is software Simon regularly uses on his IBM clone – the results are less than encouraging as it proves that software is not directly transferrable. However, in many instances it might simply be a matter of reconfiguring the format of the software though we haven't yet put this to the test.

A typical example of the sort of problems which cropped up was when trying to use the excellent *NewWord* wordprocessor. This works fine, except when you want to use it with the spelling checker dictionary (this is resident and checks your spelling after each line, offering suggestions as you go). Here the message 'Files must be greater than 20' is generated. DOS Plus cannot have more 20 files open and so this software will not run on a 512.

Conclusion

Table 5 details the requirements for IBM compatibility. If you are thinking of investing in a 512, I cannot stress too highly the importance of choosing your software first. Ask Acorn or your local dealer if the software will run – get your dealer to prove it and only then should you part with your cash.

It is difficult to advise you on whether the 512 is a good investment. Certainly at the original price of £499 I couldn't see that it was worth the money, but Acorn has now finalised the price and it is a far more acceptable £399. However, if you want to run all types of IBM software and to buy more as you progress, then ideally you should look for an IBM clone, which can be had for between £500-£800. This price compares very favourably with the £900 needed for a complete Master 512, and the IBM clone price will include monitor and drives.

If you only want to run GEM or concurrent DOS or any of the tested software, you already have a Master and don't want the clutter of a second machine then, and only then, should the 512 co-processor be considered.

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Hantarex HX12 18MHz Green Screen	**79.50 (s)**

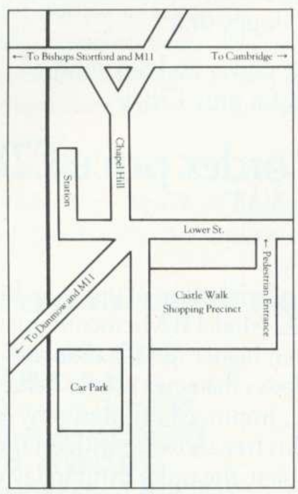
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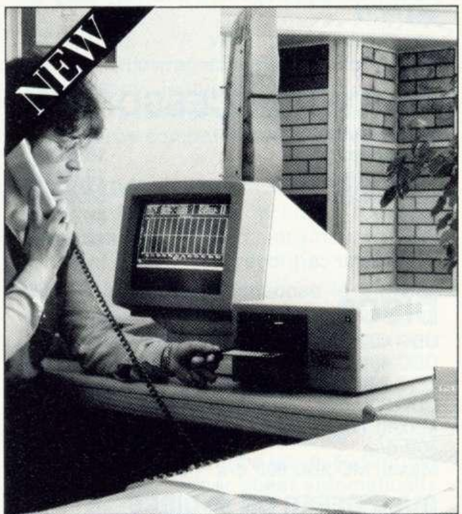
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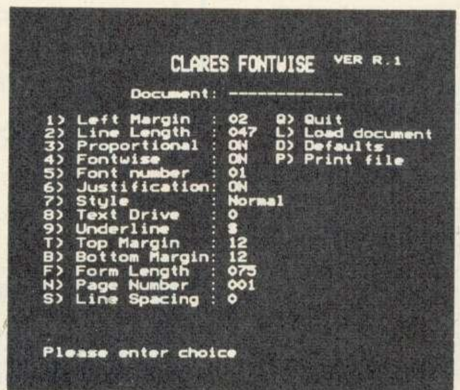
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SOFTWARE

INTRODUCE A NEW CAST OF CHARACTERS

If you want to improve your print quality – print everything twice. Patrick Quick reviews some software which does just that

Fontwise allows you to use your Epson (or compatible) dot-matrix printer to produce Near Letter Quality (NLQ) print. It does this by printing two lines of graphics mode dots, slightly offset to fill in the gaps. A third pass is used when necessary to produce deep descenders and underlines. The software is supplied on a copy-protected disc which includes 10 font definition files. It prints directly from files produced by *Wordwise* (or *Wordwise Plus*) or from straight ASCII files.



Layout etc is set up from the menu

Fontwise can justify and proportionally space and can do both at once. The choice of font, page layout, etc can be set up from the printing menu and can also be changed during printing by including embedded commands in your *Wordwise* file. Many of the embedded commands are the same as those of *Wordwise*.

The manual says that single, dual and quad density graphics are needed on your printer. However, I found that a trusty old Epson MX80 F/T III (with no quad graphics) performed perfectly well on standard print although it could not cope with condensed modes. The condensed modes are, in most cases, rather illegible anyway.

Fontwise can only be used with Basic 2: Basic 1 gives an error when you try to load a document. As *Acorn User* has carried articles showing how to emulate almost all Basic 2 facilities in Basic 1, there isn't much excuse for this shortcoming.

Paged documents in *Fontwise* don't have page headers at all and the footer is always a centred 'PAGE 1', etc. Paging without headers is a lot less useful.

Your printer *must* be switched to auto line feed. This limitation isn't necessary and I found it annoying. If Clares had read its Epson manual it would have found that line feed (ASCII 10) always ends a line correctly but Carriage Return (ASCII13) gives varying results depending on the auto line feed setting. To be fair, other NLQ software shares the same problem.

Fontwise is written to be used with *Wordwise* but they don't get on with each other terribly well. If *Wordwise* is running when you re-boot to start *Fontwise*, strange things happen and you end up still in *Wordwise*. If you try to restart *Wordwise* after *Fontwise* has been used it locks up, even after CTRL-Break and you have to switch your machine off and on again.

It's not so easy to use the facilities of *Fontwise* from other wordprocessors: it does its own justification and line splitting, taking carriage returns as paragraph ends. For maximum flexibility you will also want to use the embedded commands, which is really only possible in *Wordwise*. As far as I can see, you can't mix different fonts on the same line. The manual doesn't say you can't, but then it doesn't say you can and nowhere in the manual is there an example of a mixed line.

Fontwise can't be used over a network because it will only load text from drives 0 to 3. No OS commands are allowed, presumably to maintain copy protection.

In common with other NLQ systems, *Fontwise* produces fairly neat output which is easier to read than normal dot matrix mode but can't compare with daisywheel printing. It would be more useful for livening up the style of a school or club magazine than for business letters. The variety of fonts provided is good but more size options (eg, for headlines) and perhaps a font designer program would have added a lot to the package. Like other NLQ packages, *Fontwise* is slow because to the three passes for each line of print.

Finally, *Fontwise* is better than many NLQ packages and is reasonably priced, but don't forget that it needs Basic 2 and you can't take a backup copy.

Fontwise disc (40 or 80 track or 3"), £12 inc p&p and VAT: Clares Micro Supplies, 98 Middlewich Road, Northwich, Cheshire CW9 7DA. Tel: 0606 48511



***Fontwise* provides 10 fonts, all available as regular or condensed**

BUSINESS

NEWS



Observer may supply Prestel

Talks are under way between *The Observer* and Prestel which may lead to the newspaper providing a full news service on the network.

Terry Bell, who handles the syndication of *Observer* material, said that a report on Micronet suggesting the deal was all but signed, was 'put out prematurely', but confirmed that negotiations were well advanced.

Prestel is thought to be keen to expand the news service that it offers. The *Observer* deal would provide a large quantity of up-to-the minute reports from the newspaper's full team of journalists and correspondents.

Details of the service have yet to be thrashed out, but it is possible that it could include the weekly business reports produced by the newspaper.

Here comes the 512

by Steve Mansfield

Master 512 upgrades are now in the shops and at a lower price than Acorn originally estimated. To help users through the software jungle Acorn is releasing a list of software compatible with the micro. And to beef up the business machine even more, Acorn looks set to release a version of Concurrent DOS for the M512.

The price of the 512 co-processor is £399, including bundled software and a mouse. This is £100 less than Acorn suggested when the Master series was first launched.

Not all normal Acorn dealers will be selling the machine, however. The 512 is going through selected dealers who are expected to give a high level of customer support, particularly when it comes to telling users which software will run on the machine. To help, Acorn has produced a list, available on request from dealers or direct from the company.

Even so, the choice of software is bewildering. Peter Turnbull of Microbank – one of the first dealers to receive the 512 – suggests that potential buyers go to a dealer who also sells MS-DOS business machines, and who should have a wide range of software available to try. Alternatively, his company will try to obtain specific titles for customers.

Third party software

It is unlikely that Acorn will produce software for the machine itself, preferring to rely on third party suppliers. But it now looks almost certain that the company is to release Digital Research's Concurrent DOS for the Master.

Concurrent DOS allows up to four programs to be run simultaneously – memory permitting – with the user able to switch between them at any time. You could, for example, print out one wordprocessor document while editing another, or switch between a wordprocessor, spreadsheet and database.

The software is made by Digital Research and normally sells for around £250. No price has been fixed by Acorn, but there are suggestions that it will sell for between £100 and £200 – probably closer to the latter. The package should be available through dealers within the next couple of months.

For more details, contact Acorn on (0223) 214411.

See Bruce Smith's review of the Master 512 co-processor on page 153.

The South Bank Show

The South Bank Polytechnic in London is running an Open Computing School as part of its Microcomputer Advisory Centre. Aimed at managers and office workers, it allows you to start at any time during the term and choose the number of hours you do each evening. The tuition covers all the important business packages, including spreadsheets, wordprocessors and Basic programming.

For details write to the Microcomputer Advisory Centre, Polytechnic of the South Bank, Borough Road, London SE1 0AA. Tel: 01-928 0482.

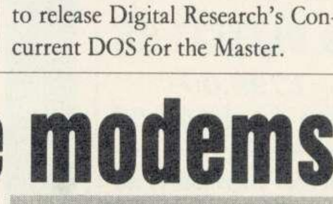
Two more modems

Newly released: two modems aimed at the business market, from by Miracle Technology and Pace.

The Miracle product (right) is a stripped-down version of their state-of-the-art WS3000 series. Known as the WS4000, the £150 modem offers full Hayes compatibility, auto-answer, auto-dial and a range of speeds.

The WS4000 can also be upgraded to give 1200 and 2400 baud full duplex, tone dialling and a host of other features.

Pace's product is actually a group of modems known as Series Four. The basic model includes 300 and 1200/75 baud options. Two further models are available allowing 1200 and 2400 full duplex operation, and the basic model can be upgraded.



Automatic mode selection, call monitoring, built-in LCD display, Hayes compatibility and microprocessor control are some of the more outstanding features.

For more details: Miracle Technology Ltd, St Peter's Street, Ipswich IP1 1XB. Tel: (0473) 216141. Pace Micro Technology, Juniper View, Allerton Road, Bradford BD15 7AG. Tel: (0274) 488211.

Bufferbox to take your calls

A new buffer allows people to send electronic messages straight to you without going through a mailbox system first. The Telepost Bufferbox incorporates a modem to answer incoming calls so that messages can be dumped in a buffer until you're ready to read them with your own micro.

Messages can be queued, and an LED display tells you when there's something in the buffer waiting to be read. The Bufferbox costs £620 – but with heavy use that could work out cheaper than a conventional mailbox.

Contact Telepost at 43 Howards Thicket, Gerrards Cross, Bucks SL9 7NU. Tel: (0753) 882028.

BUSINESS NEWS

BBC's discful of free software

Free software is on offer to users of BBC Soft's *Ultracalc 2* spreadsheet.

If you send a blank formatted disc, plus £2-worth of stamps to cover postage, you will get the disc back with a range of utilities, including a business graphics generator, to draw a variety of graphs from an *Ultracalc* file, and programs to include bold and underlined text in your spreadsheets, to draw and remove lines between columns and to import and export data between *Ultracalc* and other spreadsheets.

You can also download the files from OwlTel, BBC Soft's viewdata service, which your modem can reach on 01-927 5820. Snail mail users should send their discs to BBC Soft, 35 Marylebone High Street, London W1M 4AA.

3D spreadsheets

Cambridge Microsystems has launched a spreadsheet aimed at the business, scientific and higher education markets. *Matrix-3* runs on the Acorn Cambridge Workstation and Cambridge Co-processor systems.

It works in three dimensions with up to 10,000 rows and columns and up to 100 pages, plus all the facilities you would expect of an advanced spreadsheet.

Cambridge Microsystems, 137 Ditton Walk, Cambridge CB5 8QD. Tel: (0223) 214696.

Choose a card

The *Eureka!* card from Watford Electronics gives 14k more memory than a standard second processor for hi-versions of languages and applications like Basic, *View* and *Wordwise Plus*.

You also get two banks of sideways RAM and automatic shadow memory. The device plugs into the processor socket of a BBC micro.

New hard discs

by Steve Mansfield

In a new deluge of hard discs come three from Amcom and a low-cost unit from Acorn to complement its two existing drives.

Amcom has announced three hard disc drives with capacities of 10, 20 and 40 Megabytes. These range in price from £850 to £1400 (excluding VAT). They are compatible with any BBC micro running the ADFS, such as the Masters.

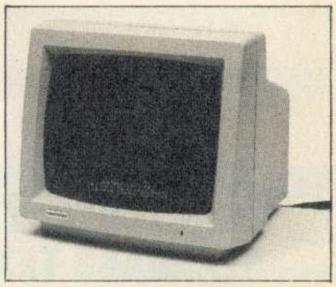
To back up the Winchesters, Amcom has brought out a number of tape streamers. These provide a fast way of backing up large amounts of memory. A streamer for the Amcom hard discs costs £1200, while one designed for use with Acorn hard discs is £50 more.

Acorn's new drive is a 20M unit. Unlike the existing 10M and 30M drives, it is not being sold as a network fileserver, but rather as a stand-alone unit aimed squarely at Master owners.

The drive comes complete with various disc utilities, but not the fileserver software. That makes it possible for Acorn to bring the price down to £1085.

At the moment Acorn has no plans to market a tape streamer. Andrew Hinchley, Communications Products Manager, explained that he has 'never liked the reliability of what's on the market. As soon as we find a tape streamer that we are totally confident with, we'll go ahead and market it.'

Amcom can be contacted at 35 Carters Lane, Kiln Farm, Milton Keynes MK11 3HL. Tel: (0908) 569212. Acorn is at Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.



Hi-res monitor from Hantarex

A new green screen monitor – ideal for people who stare at spreadsheets and wordprocessors all day – has been launched by Hantarex.

The HX12 is a 12-inch model, with RGB, composite and audio inputs. The high resolution image is suitable for 80 column modes and has an anti-glare screen. The price is a fraction under £80.

More details are available from Hantarex (UK) Ltd, Unit 2, Lower Sydenham Trading Estate, Kangley Bridge Road, London SE26 5BA. Tel: 01-778 1414.

Artistes and accountants go Gold

Accountants and performing artists who want to keep in touch can now do so with new user groups on Telecom Gold.

The British Telecom service was chosen by the Institute of Chartered Accountants of England and Wales (ICAEW) as the host for a closed user group offering electronic mail, telex and information services. A subscription gives accountants full use of all of Telecom Gold's services, including access to online databases such as World Reporter.

In addition, subscribers to the ICAEW network will have access to two special databases. The first is Pergamon Infoline's JordanWatch which carries financial data on around 60,000 UK companies. The other is Strathclyde University's AIMS News, with information on EEC and Government assistance schemes.

The other new closed user group is Artslink for musicians and performing artists. Members include Sadler's Wells, the Scottish National Orchestra and leading agents. The service contains information on artists, agents and theatres.

Telecom Gold can be contacted at 60-68 St Thomas Street, London SE1. Tel: 01-403 6777.

BUSINESS TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Mini Office 2	Database	£14.95	*	—	—	Yes	Yes	No
2	View/View 3	Acornsoft	—	—	£89.70	No	*	Yes	Yes
3	Database	Gemini	£19.95	£23.95	—	No	*	No	No
4	Home Mate (Office Mate)	Gemini	£12.00	£12.00	—	Yes	Yes	No	No
5	Wordwise Plus	Computer Concepts	—	—	£56.35	—	—	Yes	Yes

Compiled by Gallup/MicroScope. *Contact publisher: Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. (0442) 63933. Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411. Gemini, Gemini House, Dinan Way, Exmouth EX8 4RS.

BUSINESS

WORDS OF WISDOM

Our wordprocessing expert presents another bunch of handy hints, technical tips and verbal variations for users of *View* and *Wordwise*

Jacquetta Megarry

SHORTCUTS FOR STANDARD TEXT

Once you've been word processing for a while, you'll find that many of your documents fit certain patterns. You'll also probably have found that you have to type in an infuriating number of odds and ends every time you switch on. Here are two shortcuts that let the system take care of things automatically.

The first is sometimes called a 'template' or dummy file: an empty file that contains any format commands and/or standard text that you need regularly. For example, a correspondence template might contain your letterhead, the date and your signing off greetings. Load in the template before inserting your letter into the body of the document. This system not only saves time, but also guarantees that your work will maintain a standard appearance. Keep as many templates as you have standard documents that you use often.

```
*FX228,1
*TV0,1
MODE 3
*KEY1 Acorn User¦M141/
3 Drury Lane¦MLondon¦M
WC2B 5TF¦M¦M
*KEY2 Anything you wan
t key 2 to produce
*WORD
*.
```

Figure 1. Typical !BOOT file for *View*

The second shortcut is to create a 'boot' file to store your start-up commands. The disc system will search for a special file called !BOOT whenever you 'boot' that disc, ie, hold down Shift, press and release Break, then release Shift.

Although you can create !BOOT files in Basic using the *BUILD command, they're quicker and easier to write and edit within your wordprocessing system. Simply save your instructions giving !BOOT as the filename and then enter *OPT4,3 to 'enable' the !BOOT file. Copy the !BOOT file (repeating the *OPT4,3 to make it 'boot-able') on all future working discs. If you want to prepare a batch of blank but formatted working discs, simply load the !BOOT file into your wordprocessor and save it to each disc in turn, not forgetting the *OPT4,3 command.

In the two examples (figures 1 and 2), type the commands as you would text, remembering to press Return at the end of *each* line including the last. Include any commands you need, such as *FX6 if your printer is set to ignore line feeds. You can program as many of the red function keys as you like, though you may need an extension to your keystrip to remember what you've put where.

```
*TV255,1
*KEY1 ¦!!ds¦!"
*KEY2 ¦!!de¦!"
*KEY12 ¦!!oc27,45,1¦!"
*KEY13 ¦!!oc27,45,0¦!"
*WORDWISE
*.
```

Figure 2. *Wordwise* !BOOT file

The first !BOOT file is for *View*: you need *FX228,1 if you want to program function keys to produce strings. The second line makes the mode 3 rock-steady (by switching off the interlace) but it only works when you change mode so put this instruction *before* the Mode 3 command. The next line programs red key f1 with a useful address: press CTRL-Shift-f1 in Edit Mode and the address will emerge complete with new lines wherever there's a ¦M in the boot file (equivalent to pressing Return). You can program keys f0 to f9 in exactly the same way; see below for how to define Copy and the arrow keys. Finally, *WORD selects *View* and *. catalogues the disc.

Notes for Master users: (1) replace MODE 3 by MODE 131 to benefit from the extra memory (bytes free jumps from 12,542 to 28 926., 2) you won't need the *TV0,1 as this is set as the start-up Configuration.

The *Wordwise* boot file's first line lowers the screen display by one line – handy if you're using a television screen for wordprocessing. Defining the red keys works as in *View*, but here I've employed them to store embedded commands. In 'recent *Wordwise*' (as I shall call *Wordwise Plus* and 1986 *Wordwise*), keys 1 and 2 are thus defined to switch on and off double-strike printing; 'old' *Wordwise* users replace ds by *oc27,69* and de by *oc27,70*. Keys 12 and 13 are the left and right arrow keys; here they switch underlining on and off.

These two keys can be especially useful for defining any effect you need often, because, when they are pressed with CTRL, the cursor scoots neatly from word to word. ('Recent' *Wordwise* users can substitute *us* and *ue* for the *oc* codes, giving full preview of underlining effects on screen.)

You can also program the down and up arrow keys and Copy by numbering them 14, 15 and 11 respectively. Incidentally, you can use capital letters for embedded commands if you prefer, but be consistent: the red keys will produce *exactly* what you tell them to, in lower-case or capitals.

Personally, I use lower-case for all commands as it's quicker to type, but here I've shown commands like OPT, FX and ¦M in capitals to make them stand out. The only command that *needs* capitals is MODE 3.

FURTHER READING

Now, a word about some recent publications. *Word Processing on the Home Computer* is an independent user group with a readable magazine. It aims at Amstrad, Atari and BBC micro owners and contains interesting insights into how the systems differ. One year's membership (six issues) costs £6 from *Word Processing*, PO Box 67, Wolverhampton.

For anyone interested in professional typesetting from wordprocessor disc files, *Typesetting for Micro Users* is an invaluable companion. It helps newcomers to communicate effectively with typesetters, guides them through the concepts and activities and provides a wealth of useful examples.

The book includes model coding forms, an explanation of typesetting terms and an index. It costs £9.50 from Quorum Technical Services, Sandford Park Trading Estate, Cheltenham, GL52 6XH.

Finally, *View* users who have lost their manuals or are foxed by printer driver problems may like *Help Screens from View*. Although it presents the same information that can be found in the printed manuals, this friendly disc is easier to use, especially if you want to go

beyond bold and underlining printer effects or have a non-standard printer. However, you cannot call a help screen while in Edit Mode, and the disc adds a *fourth* (!) meaning for each function key. The disc is Master-compatible and costs £9.95 from Ceedsoft, 58 Saville Road, Blaby, Leicester.

DATE-STAMPING AND THE MASTER

Apologies to C G White, M J Skaife d'Ingerthorpe and other readers who found my May tip for accessing the Master's clock/calendar in *View* incomplete: press ¦T for time and ¦D for date in Edit Mode. What Acorn failed to tell me is that you *must* have an Edit Command in the left margin of the same line: press Shift-f8 and type something like LJ. Now ¦T or ¦D in your text will produce the time to the instant (uses, anyone?) or the current date (14 August 1986) when you preview (using SCREEN) or print.

It doesn't seem to matter which Edit Command you use, as long as there is one on that line. No-one at Acorn could explain why this facility had been provided and then had its usefulness restricted so much. *Wordwise* users can access the Master's clock/calendar after a fashion, too, using the operating system embedded command: *time in green will be replaced by the day, date and time all on a line of its own when you preview or print. Personally I can't find a use for this as I can't edit it, but perhaps someone out there can?

YOU CAN COUNT ON IT

Thanks to Bob Tennent of Glasgow for pointing out that *Wordwise Plus* users can execute a statement such as PRINT "0123456789" from a segment to number the first ten columns of preview screen: mark and copy these numbers seven times to number all 80 columns. If your system also does the *FX155 trick (see Colourful Grid Check, right), you can combine these to get something like a *Wordwise* 'ruler' as follows.

First, embed seg0 at the top of main text. Then select segment 0 and enter:

*FX155,n *choose n as above/below*
PRINT "01234..." *80 numbers*
VDU14 *optional*

Enter these as text (*don't* embed them), followed by Return. Return to main text and preview: you should now have paged preview with overlaid numbered lines for checking 80-column format. Leave these instructions in segment 0 and just remove the f1 (green) in front of seg0 if you want to cancel the effects.

To load this in automatically, first save whatever instructions you want as, say, PREVIEW. Then create (or add to) your !BOOT file as follows:

```
*wordwise
:select segment 0
:load text "PREVIEW"
:select text
```

Bob Tennent has also managed to insert screen dumps into *Wordwise* printout. Suppose you have a mode 1 picture saved on disc as a memory dump called PICTURE and want to dump it using a *Printmaster* ROM. Enter Segment 0 (or whatever segment is free) and type the following little program:

```
VDU22,1
*LOAD PICTURE
*GDUMP 0 0 2 1 20
VDU22,0
```

The first line puts the system into mode 1 (to match your picture) and the last restores mode 0 (for *Wordwise* preview). The second line loads in the picture and *GDUMP tells *Printmaster* how and where to dump the picture (substitute as appropriate if using a different screen dump program). Return to main text and embed seg0 at the place where you want the picture. By inserting a *WINDOW command before the *GDUMP, *Printmaster* users can control exactly which bit of the picture to use.

CONTROLLING SCROLLING

Many people have trouble with controlling scrolling, especially in long documents. You have to watch carefully for the bit you want, and if you miss it when it flashes past, you have to start again from the Menu. If you'd rather have the scrolling pause automatically, *Wordwise Plus* users can put VDU14 in a spare segment and embed a seg command to execute that instruction at the top of the document.

For example, if segment 0 is empty, just type in VDU14 (or vdu14) and enter embedded command seg0 at the top of your text. Now press Menu option 7 to see a 'paged' preview: press Shift to advance to the next 'page' – there is plenty of overlap. Take the seg0 command out of your document before printing it, though, or you'll keep having to press Shift to complete the printout.

Users of recent versions of *Wordwise* can control scrolling in preview mode by pressing the space bar to pause and almost any black key (not Break) to restart. If your *Wordwise* is an older version, you must hold down Shift and CTRL together to pause and release either or both keys to restart. (*Wordwise Plus* users can use whichever method they like.)

COLOURFUL GRID CHECK

If you vary margins and line length or use a lot of tabs and indents, it's not easy to check the exact effects in *Wordwise* preview and you may have to resort to draft printouts. Thanks to Gary Crawford of Crawley Down for a neat tip for superimposing a grid of 80 vertical lines so you can count characters and can check the alignment on your preview screen. The effect depends on a *FX155,n call that uses a quirk of the ULA system in recent Beebs and Masters – but won't work at all in older Beebs: to test your machine, try *FX155,1 with or without text then press preview, or use Basic (enter MODE 0 first).

Within *Wordwise*, embed FX155,n at the top of your text using embedded command * or OS"" depending on which version of *Wordwise* you have. The number n controls both the colour and positioning of the lines. I'll explain this with examples, using the *Wordwise Plus* version. *FX155,1 produces a red grid, *FX155,2 a green grid and so on up to 15; if you really want flashing green and purple lines, try *FX155,10. (*Wordwise* users may need to use the form OS"FX155,1" instead, or may have too early a version for operating system commands at all.)

So far, these numbers all produce grid lines to the left of the characters so that if you've set lm10 you'll see a clear left margin of 10 columns with text beginning to the right. You may prefer to see each character centred on a vertical line; if so add 48 to each colour number. Thus *FX155,49 produces a different version of the red grid, *FX155,50 of the green, and so on. (Try adding 16 or 112 instead to see other positions.)

The effect won't work at all in 40-column preview (the kind you get with long documents unless you've Master or a memory expansion in a Beeb). But if it works on your system and you find it useful, experiment to find the colour and positioning of the lines which suits you best; this depends on your screen as well as whether you prefer to count lines or spaces. Then make a note of the command or, better still, include it in a !BOOT file (see above) on your working disc. The FX call doesn't affect your printout or editing in any way, so you need not remove it from a document unless you find it distracting.

ACORN FORUM

The 1770 disc controller clip is capable of more operations than your DFS ever dreamed of. Mike Barwise examines how to conduct a dialogue with the chip itself

In the July 86 issue, David Atherton covered the programming of the Western Digital 1770 disc controller chip, using the 'legal' OS commands. This month I am discussing programming it at the lowest level of control available to the user – direct dialogue with the chip itself. This is unnecessary in normal read/write circumstances, but the 1770 is capable of certain operations which are not implemented in the DFS, and which can be valuable.

The 1770 is in fact a very simple chip to drive. Its initially bewildering range of options can be reduced quite easily to a working set of commands which suit the hardware implementation in use, and the chips's architecture is extremely memorable and sensible. (In passing, it is worth noting that anyone using an independent FDC with a 1790 series or 2793 chip can directly transplant practically all of the following information.)

Drive select

The 1770 knows nothing about multiple drives: it is only aware of the drive currently selected by external hardware. As the drive select logic and the base address of the chip itself will vary depending on the machine you are using (BBC B with independent FDC, ditto with Acorn FDC, B+, Master) I would refer you to your technical manual and to David Atherton's article for details.

The 1770 performs the head positioning and data read and write operations on any currently selected disc surface. Each operation is independent, so a disc transfer typically consists of:

1 restore head to track 00

2 read sectors 00 and 01 (catalogue)

3 analyse file parameters

4 seek to first track of file

5 read (or write) sectors from first to either end of track or end of file if sooner

6 if end of track but not end of file, step to next track

7 repeat (5) and (6) to end of file unless error.

It will be seen from above that there are two main kinds of operations the 1770 can perform: head movements and data transfers.

This division is visible throughout the 1770 command and status set, and allows a simplified device architecture, as the majority of control and status bits are dual tasking depending on the type of operation. This means that two separate error checking routines will be needed, one for head movements, the other for data transfers, otherwise curious results will be returned. Western Digital in fact divides operations into four types. WD type 1 commands are the head movement operations, types 2 and 3 are data transfer operations, and type 4 is a single special command, Force interrupt.

		Bits							
Type	Command	7	6	5	4	3	2	1	0
I	Restore	0	0	0	0	h	V	r_1	r_0
I	Seek	0	0	0	1	h	V	r_1	r_0
I	Step	0	0	1	u	h	V	r_1	r_0
I	Step-in	0	1	0	u	h	V	r_1	r_0
I	Step-out	0	1	1	u	h	V	r_1	r_0
II	Read Sector	1	0	0	m	h	E	0	0
II	Write Sector	1	0	1	m	h	E	P	a_0
III	Read Address	1	1	0	0	h	E	0	0
III	Read Track	1	1	1	0	h	E	0	0
III	Write Track	1	1	1	1	h	E	P	0
IV	Force Interrupt	1	1	0	1	I_3	I_2	I_1	I_0

Command summary

h = Motor On Flag (Bit 3) (1770 and 1772 only)

h = 0, Enable Spin-Up Sequence
h = 1, Disable Spin-Up Sequence

V = Verify Flag (Bit 2)

V = 0, No Verify
V = 1, Verify on Destination Track

r_1, r_0 = Stepping Rate (Bits 1,0)

r_1	r_0	WD1770-02 WD1773-02	WD1772-02
0	0	6 ms	2 ms
0	1	12 ms	3 ms
1	0	20 ms	5 ms
1	1	30 ms	6 ms

u = Update Flag (Bit 4)

u = 0, No Update
u = 1, Update Track Register

Flag summary

m = Multiple Sector Flag (Bit 4)

m = 0, Single Sector
m = 1, Multiple Sector

a_0 = Data Address Mark (Bit 0)

a_0 = 0, Write Normal Data Mark
a_0 = 1, Write Deleted Data Mark

E = 30ms Settling Delay (Bit 2)

E = 0, No Delay
E = 1, Add 30ms Delay

P = Write Precompensation (Bit 1)

P = 0, Enable Write Precomp
P = 1, Disable Write Precomp

Type II & III commands

Device architecture

The 1770 itself occupies four bytes of mapped in/out. All four are read/write locations, but the lowest is dual purpose. This is the Command register (write) and Status register (read). (Note that this distinction has nothing to do with disc read/disc write.)

The remaining three (in ascending order) are the Track register, the Sector register and the Data register. The first two behave just like static RAM, and the Data register is read from or written to during transfers on a byte-by-byte basis under the control of the BBC NMI.

The table (left) shows the function of each bit in each of the byte-wide 1770 op codes. The most significant three or four bits of each are fixed, and the rest are variable according to the detailed requirements of the current drive interface. You can now see the relevance of the division of the commands into two sets: the control bits are consistent in function within type 1 commands, and different but equally consistent in function within types 2 and 3. From type 4, the only really useful command is &D0, which is used to terminate an operation in progress and re-initialise the 1770.

Similarly the status register (table 2) contains certain bits which dual-task according to command type: bits 1, 2 and 5.

When experimenting with the 1770, it will probably pay to use all the 'safe' options: Enable Spin-up, Verify On Destination, Add Setting Delay.

The Update Track Register bit is used if you use Step to move between tracks, but it is equally valid to use Seek every time, and this automatically keeps the track register content correct. Single sector transfers are much easier to handle than multiple sector transfers, as the latter *always* terminate with a 'Sector not found' error on completion. Only normal data marks are used, and Write Precomp should not be used in single density. In double density, it should be enabled for all write operation to disc where the target sector is roughly in the innermost third of the data area – track 27 decimal onwards (40 track) and track 52 decimal for 80 track.

Driving the 1770

Let us look first at the basic mechanisms of 1770 operation. The first most important point is that (with the exception of the type 4 command) no command op code should be

sent to the chip while it is busy (status bit 0 set). This bit should be tested before sent a command. Note that due to an architectural bug, is possible for this bit to remain set after a system reset. If you know you are *not* performing a disc operation, but Busy is still set, a Force interrupt (&D0) can sent at any time to the command register. This will clear the Busy status, but the currently selected drive will spin up. Unless the drive is ready (door closed, disc in place) the drive will remain spun up, as the 1770 looks for six index pulses before termination. A hard reset after the &D0 op cures this, but about 50 microsecs must elapse between sending the op code and the reset to allow the command to execute.

Bit Name	Meaning
S7 MOTOR ON	This bit reflects the status of the Motor On output.
S6 WRITE PROTECT	On Read Record: not used. On Read Track: not used. On any Write: it indicates a Write Protect. This bit is reset when updated.
S5 RECORD TYPE/SPIN-UP	When set, this bit indicates that the Motor Spin-Up sequence has completed (6 revolutions) on Type 1 commands. Type 2 & 3 commands, this bit indicates record Type. 0 = Data Mark. 1 = Deleted Data Mark.
S4 RECORD NOT FOUND (RNF)	When set, it indicates that the desired track, sector or side were not found. This bit is reset when updated
S3 CRC ERROR	If S4 is set, an error is found in one or more ID fields; otherwise it indicates error in data field. This bit is reset when updated.
S2 LOST DATA/ TRACK 00	When set, it indicates the computer did not respond to DRQ in one byte time. This bit is *reset* to zero when updated. On Type 1 commands, this bit reflects the status of the TR00 signal.
S1 DATA REQUEST/ INDEX	This bit is a copy of the DRQ output. When set, it indicates the DR is full on a Read Operation or the DR is empty on a Write operation. This bit is reset to zero when updated. On Type 1 commands, this bit indicates the status of the IP signal.
S0 BUSY	When set, command is under execution. When reset, no command is under execution.

Status Register description (WD1770-02 and WD1772-02 only)

As soon as you are not Busy, the drive head should be Restored. This command retracts the head to track 00 and loads the Track register with zero. Note that every time you switch to a new surface, you must Restore. Restore does not require any parameters: track zero is implied. After Restore has terminated, status bit 2 should be examined to establish whether the operation was successful.

The next command is Seek. After your Restore, the Track register holds zero. To seek to a given track, you load the track number (remember that numbering starts at zero, not one) into the data register, and then send the Seek op code you have derived from table 1. Internal arithmetic is performed, and the direction and extent of the seek are automatically established. If Spin-up has been selected, the drive *must* be ready. Busy is monitored by polling until the operation is complete. If the Seek was successful, status bit 4 is clear (zero) and the Track register contains the target number. Seek will fail if you have selected too fast a step rate for your drive.

Step operates in a similar manner, except that no target parameter is needed, and the direction used is the last known direction. Thus after a step out, the next step is also out and so on. Step in and Step out are used to change direction and also perform the *first* step in that direction.

Data transfer commands.

All read and write commands use parameters stored on disc at the time of formatting. The length of sector to be transferred is one of these parameters. However, the BBC DFS (most series and sources) expects a specific sector length of 256 bytes. Thus sectors of other lengths cannot be read by the DFS.

After a data transfer command is issued, the 1770 issues one NMI for each byte to be transferred. In single density, the NMI occurs at intervals of 64 microsecs, and at double density, at intervals of 32 microsecs. Note though that the NMI to byte transfer delay (your software run time) must not exceed 45 microsecs in single density or 22 microsecs in double density. These times are from issue of the NMI (not recognition of it) to effectively the start of the instruction after the read or write byte from/to the 1770. The NMI recognition time is generally about 7 microsecs.

Control is transferred to &D0 which normally contains an RTI, effectively masking the NMI. But before calling a data transfer command a 'JMP routine' should be installed there. 'Routine' is the entry point of suitable machine code in the user program. Bear in mind that you *must* save all registers on the stack before doing anything else, and that a trivial 'idler' foreground task should be set up, to avoid the user program advancing during disc transfer. This last is a common fault, as you can inadvertantly overwrite data while you are sending it to disc.

If you fail to service an NMI from the 1770 in due time, disc sector Write operation is terminated immediately, and status bit 2 is set. During a Read sector from disc, failure to service (lost data) does not terminate the command. The byte unserviced is lost, but transfer continues to the end of the data field (sector). However, there will always be a CRC error as well as a Lost Data flag.

When using the Read sector and Write sector commands, the track is assumed to be already selected by a previous Seek or Step, and the user must load the required sector number into the Sector register before issuing the data transfer op code.

The Read Address command is useful for establishing two things: the current head position and the approximate format of the disc.

When the command is issued (no parameters), the 1770 looks for the first ID field it can find and transfers it to the micro. Six NMIs are generated: one for each byte of the ID. The bytes correspond to:

1 Track number
2 Side number
3 Sector number
4 Sector length code
5 & 6 CRC

CRC error is also indicated in the status register (bits 3 & 4).

The final commands are Read and Write Track. Write track primarily equals Format: there isn't space to go into formatting here, as the operation consists of setting down a complete track's worth of data including gaps, flags and embedded op codes for the 1770.

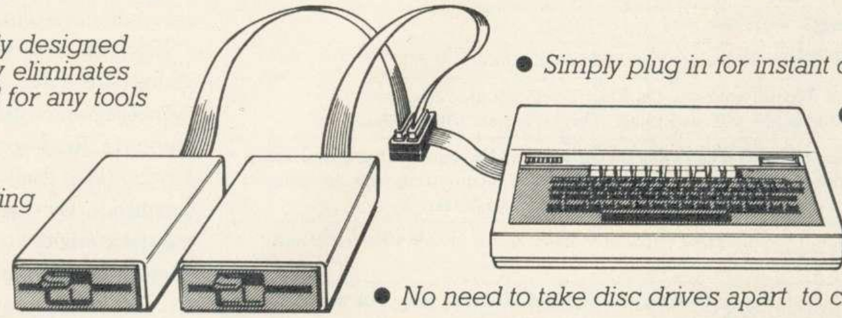
Read track, however, is a very useful command. This dumps the whole data stream (user data, gaps, headers, etc) straight to memory. There will be lots of data (more than 3.5k typically at single density), but corruption of ID headers and so on will not prevent access, so easily screwed discs can be recovered.

There will always be slight corruption of gap bytes, due to disc speed variations and so on during previous disc operations, but this should be clear by comparison with similar gaps in consecutive sectors. If you can find the damaged ID or whatever, the Write track can be used to restore the disc to perfection after corrections have been made.

See *AU* April and May for details of how to interpret the various parameters listed above.

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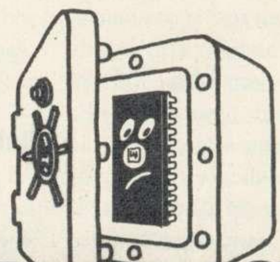
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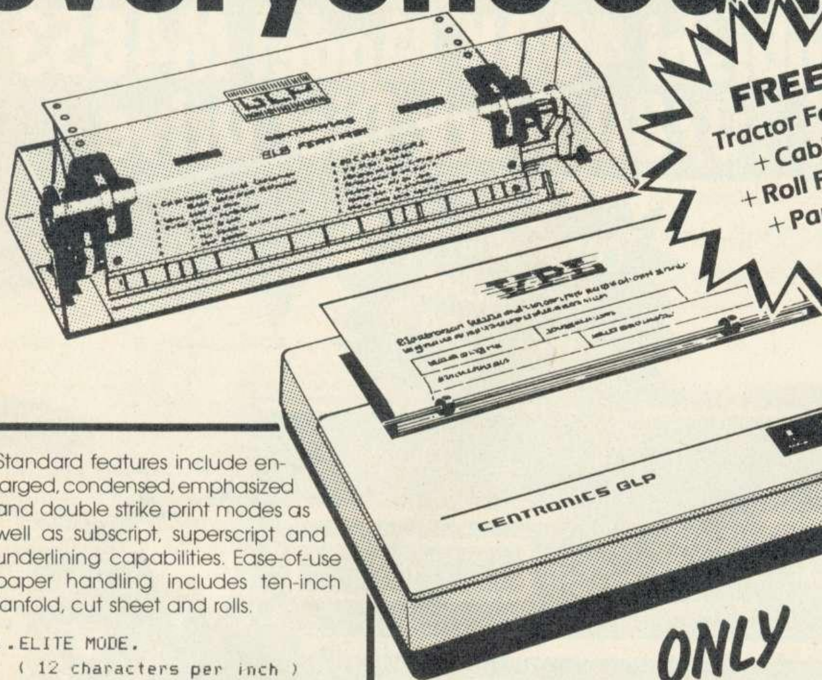
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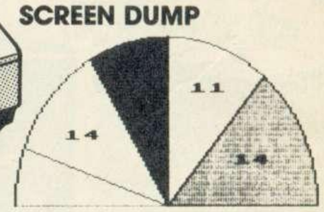
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3.DOUBLE STRIKE.
  (Characters printed twice)
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5.SUPERSCRIPT CHARACTERS
6.SUPERSCRIPT CHARACTERS CONDENSED
7.SUBSCRIPT CHARACTERS
8.SUBSCRIPT CHARACTERS CONDENSED
9.ITALIC CHARACTER SET.
```

SAMPLE OF NLQ
(NEAR LETTER QUALITY)

```
The quick brown fc
jumps over the laz
The quick brown fc
jumps over the laz
The quick brown fc
```

ACTUAL SIZE

SAMPLE USING EPSON SCREEN DUMP

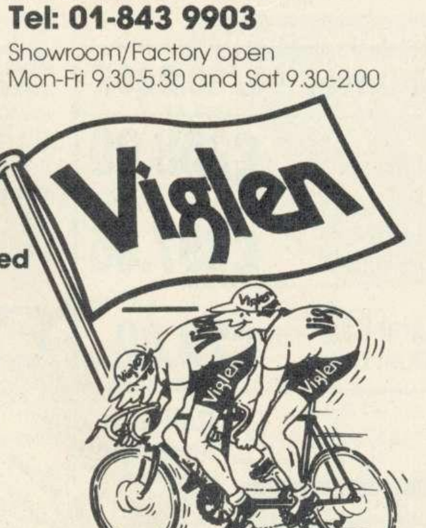


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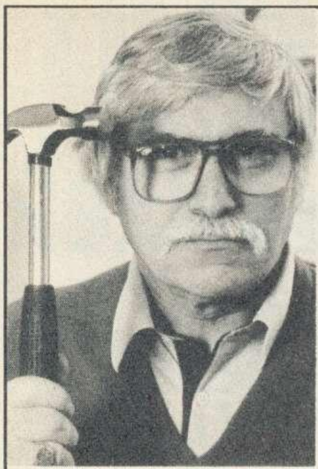
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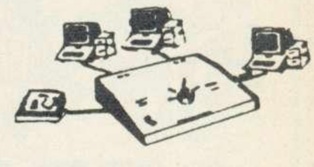
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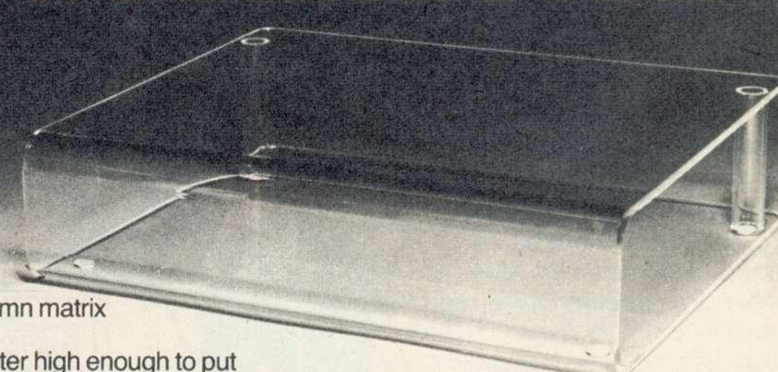
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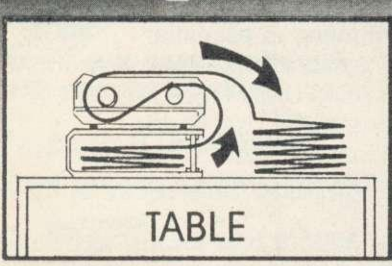
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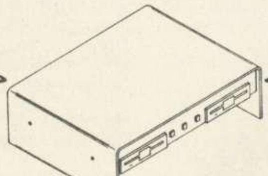
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ACORN USER'S

DIARY

The games people play...

Tynesoft is nothing if not topical. Following the company's coup in bringing out an Ian Botham game at the height of the drugs scandal, Tynesoft has again displayed its superb timing by bringing out a computer simulation of the Commonwealth Games.

We haven't seen the game yet, but it is rumoured that the program makes extensive use of the delete key, particularly when it comes to selecting teams.

Now we can exclusively reveal that another firm is trying to muscle in on this obviously lucrative area. Newkey Broonsoft's first attempt at topicality is a travel adventure program entitled *Geoffrey Howe's African Tour*. The object of the game is to travel through a mythical land meeting up with absolutely no interesting characters whatsoever.

A feature of the game is that whenever the program asks you a question you must avoid answering it directly. A straightforward reply will result in you being demoted to Minister of Public Conveniences, although you will, of course, put out a statement claiming it to be a promotion.

Dense is the word for it

Do you want twice as much memory from your micro? Well, one computer journalist obviously does. This poor deluded person, working for another BBC computer magazine (no names, our lawyers are getting nervous), recently rang the manufacturers of a disc filing system with a query.

The filing system in question allows single and double density operation, and also allows you to use sideways RAM as a RAM disc. What the hack wanted to know was how to get double density storage in sideways RAM.

Perhaps the question isn't as silly as it seems. Perhaps the hack has found some wonderful new compaction technique for squeezing every byte into a nybble. Perhaps the BBC micro supports double density RAM and Acorn simply hasn't told anyone. Perhaps that was a pig that just flew past my window.

Val goes home

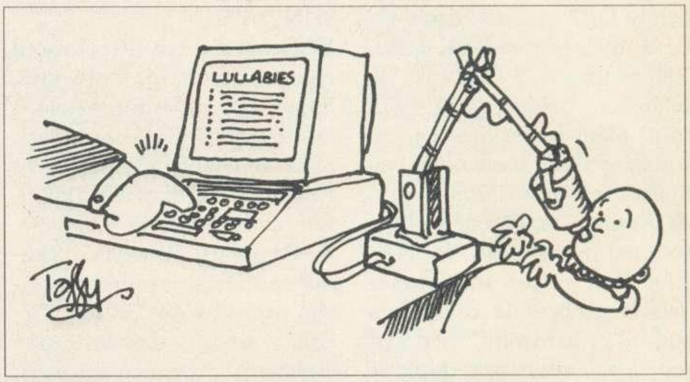
Valerie Holt, who until recently was burdened with the title 'Corporate Communications Manager' at Acorn, has left the company. The move is put down to 'pressure at home'.

However, Valerie, who once revelled in shouting matches with domineering publisher Robert Maxwell, was known to be frustrated at not being able to establish the same relationship with the passive Acorn boss Brian Long.

A loss to Acorn, one of the bastions of male computing.

Tea-leaf on the premises

Following reports of early-morning break-ins at the offices of Redwood Publishing, *Acorn User* sleuths have now traced the culprit. It turns out to be none other than our very own – until recently, that is – Dear Kitty. Although she left us for the illusion of fame and fortune at another company (see last month's diary), poor homesick Kitty has been coming back to make cups of tea. (They don't get a kettle at *Computing*.)



Fresh from the nursery

At last, the first picture of the new Baby Beeb. It's not quite what we were expecting, admittedly, but should provide welcome relief to harassed parents.

Special features on the new micro include a unique digital-to-gripe-water interface and a whole new range of operating system commands, such as *BURP, *CHANGE and *DUMMY. Other star commands have assumed new meanings with the BB. The most important of these are *INSERT (illustrated), *UNPLUG and the dreaded *DUMP.

The picture was supplied by the Reverend 'Taffy' Davies, a man of obvious humour and no mean skill with the pen.

Curry takes a powder

Gossip about a possible link between Chris Curry's sudden move away from Acorn and the announcement of Tynesoft's *Vindaloo* game appears to be unfounded.

Curry has sold his remaining shares in Acorn in order to devote his time to selling Acorn micros — well it must make some kind of sense to someone.

No mention has been made of any involvement by Curry in the games software market, so we have to assume that the appearance of *Vindaloo* is just one the bizarre coincidences that you get in this crazy business.

The game is considered by the trade to be hot stuff, and should be running up the charts soon. Unfortunately, when we tried to contact Mr Curry for a comment he was indisposed.

Who cares?

The *Acorn User* offices have been swamped by an entry for last month's Kneed-to-Know competition, where we asked you to guess the identity of an *AU* contributor from an early photograph. The entrant, one Nikolas Evanovitch, claims to know the mystery character personally.

Meanwhile, neighbours of the *AU* contributor in question have noted increased police activity around his house following the disappearance of his wife, Jill, who supplied us with the picture, and his sudden keen interest in gardening.

STOP PRESS: As we were going to press two more entries flooded in to the office. Paul Aston of Shepperton believes the knees to belong to John Cleese while El Smith of Dulwich thinks they are Jimmy Hill's. However neither of these two is famous for being an *AU* contributor.

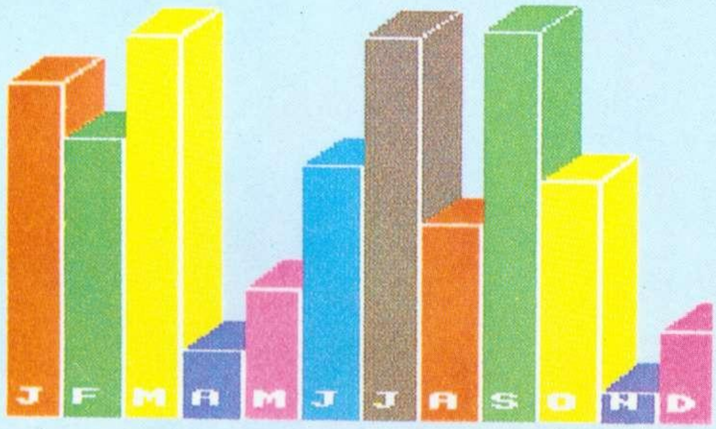
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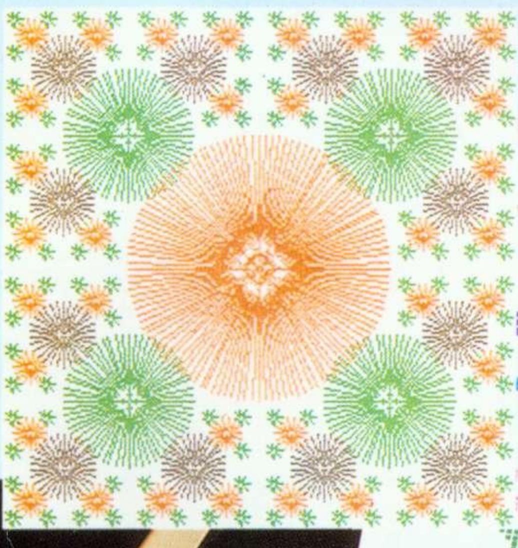
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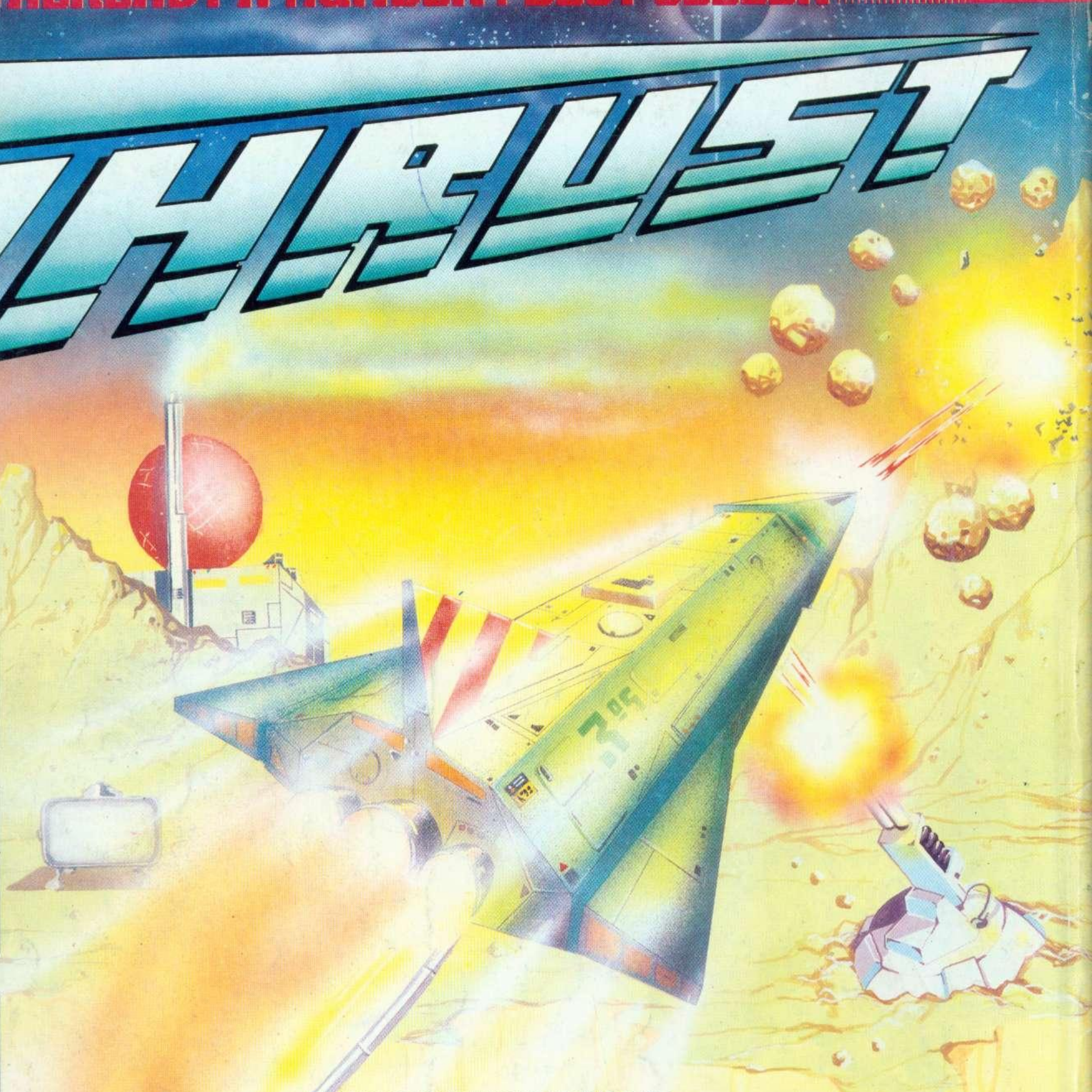


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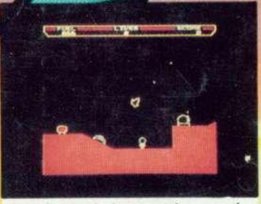
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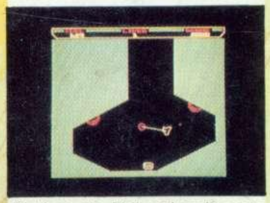
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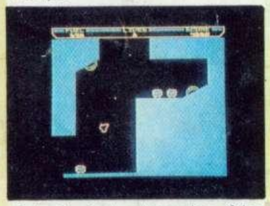
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REVIEWS OF THRUST ALREADY PUBLISHED
Zzap! 64: "The most enjoyable game we've played for ages..." — A ZZAP! SIZZLER.
Computer & Video Games: "Thrust is a simple but totally addictive game..." — A C+VG HIT!

BBC MICRO

ELECTRON

Now available for the BBC Micro and Electron

The Commodore-64 version of Thrust (published by Firebird Software) shot immediately to No.1 in the software charts and was greeted with rave reviews throughout the computer press. Equally addictive and just as enjoyable, the BBC Micro and Electron versions of the game are set to emulate this performance.

Thrust is simple, fun-to-play, yet totally realistic and intensely challenging. Your mission is to visit 24 planets in turn collecting the Klystron Pods and, if possible, destroying each planet's reactor system. Your spaceship and the pods, which are heavier than the spaceship, move authentically subject to the laws of gravity, inertia and momentum — indeed the game's author, Jeremy Smith holds a First-Class Honours degree in Physics! Careful planning of your manoeuvres is essential in order to prevent the pods swinging out of control and dragging your spaceship to destruction.

To add to the challenge, the planets have different gravity rates and, as you progress through the game, some have "reverse gravity" or "invisible landscapes". They are defended by automatic limpet guns strategically placed to protect the pods and fuel tanks — the only source of replenishment for your limited fuel supply. The smooth screen-scrolling, which is exemplary, and the realistic action gives the player a fascinating feeling of floating through space.

PRICE: £7.95 (cassette), £11.95 (BBC disc)

COMPETITION COMPETITION COMPETITION COMPETITION

If you complete the mission by collecting the pods from all 24 planets, you can enter our competition. The prizes include the beautiful trophy (pictured on the right), **£250** cash, and 3 copies of the captivating book **"The New Atlas of the Universe"** by Patrick Moore.
Closing date: 31st January, 1987.



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